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Result-Enhanced EMS Auditing in an Energy Utility

by

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requirements for the degree of *Master of Science*

in

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Abstract

The potential to integrate result and system- based environmental performance measurement (EPM) in the context of an energy utility is studied. A model is proposed to provide for a Result-Enhanced Internal Management Systems Audit Program (REIMSAP) based on case utility analysis of environmental management systems (EMSs) in a Canadian fully-integrated energy utility. The application of the REIMSAP model requires a clear and effective EPM network that drives the flow and application of measurement information. Based on the EPM network, REIMSAP involves an audit scope, coverage and criteria determination (SCCD) process that serves to incorporate result-based EPM considerations into audit planning. It is found that the REIMSAP model and its supporting EPM network can be integrated with and can facilitate business planning (BP) and environmental performance reporting (EPR). Finally, it is found that with an integrated BP process, clear responsibilities, strong communication, and meaningful measures, the REIMSAP model can provide a framework for the integration of management system assessment processes.

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Glossary of Terminology and Abbreviations

Audit Scope – Defines the boundaries of an audit based on business areas, locations, and/or personnel.

Audit Coverage – Defines the activities, programs, processes, and/or management system elements to be assessed through auditing.

Audit Criteria – Defines the standard or condition against which audit evidence will be evaluated.

Business Planning (BP) Processes or Cycle – Includes business planning and business plan review processes. Business planning defines a business area's mission, goals, objectives, targets, programs, and strategic actions over the course of a given time interval. Business plan reviews serve to assess a business area's performance related to the material identified in its business plan.

Canadian Electricity Association (CEA) – Industry group for Canadian electrical utilities.

Emergency Control – Includes protocols, requirements, procedures, codes of practice, and/or guidelines that govern emergency prevention and/or response activities.

Environmental Commitment and Responsibility (ECR) Program – CEA program aimed at facilitating environmental management and reporting in Canadian electrical utilities.

Environmental Objective – Environmental management strategy or goal that an organization defines to set direction and plan environmental actions.

Environmental Management (EM) – Act of managing environmental aspects in an organization.

Environmental Management Control – Includes protocols, requirements, procedures, codes of practice, and/or guidelines designed to protect environmental and employee safety by governing certain operational, emergency prevention and response, or regulatory compliance activities (i.e. can include operational control, emergency control or regulatory compliance control).

Environmental Management System (EMS) – System providing the construct for the management of an organization's environmental aspects.

Environmental Performance Coordinator (EPC) – Role in an energy utility established as a champion for environmental performance within a particular business area. Supplies a particular review process (e.g. BP review) by performing data compilation, analysis and communication functions.

Environmental Performance Measurement (EPM) – Process aimed at facilitating decision making on environmental matters. Can involve result or system-based EPM.

Environmental Performance Reporting (EPR) – The act of publishing environmental performance data and information. Involves environmental performance report planning, preparation, review and approval, and dissemination.

Environmental Program – Activities or projects defined by an organization to achieve environmental objectives and targets.

Environmental Target – Performance condition defined within an organization to achieve environmental objectives, to effectively implement environmental programs and to comply with environmental legislation.

Greenhouse Gas (GHG) Emissions – Release of gases contributing to global warming and climate change

Integrated Management System (IMS) – Management system that harmonizes and integrates multiple stakeholder specific management system processes and elements. Stakeholder specific management systems may include quality, environmental, safety, social accountability…etc.

Internal Audit Department (IAD) – Functional business area in an organization charged with conducting internal audits and managing an internal audit program.

Occupational Safety and Health (OS&H) – Deals with the overall well-being of employees.

Operational Control - Includes protocols, procedures, requirements, codes of practice, and/or guidelines governing certain operational activities that can lead to environmental impact.

Performance Measurement (PM) – The act of measuring a particular aspect of performance in an organization

Regulatory Compliance Control – Includes protocols, procedures, requirements, codes of practice, and/or guidelines that govern certain activities with imposed legal requirements.

Result-Enhanced Internal Management System Audit Program (REIMSAP) – Audit program designed to incorporate result-based performance measurement into management system-assessment activities.

Result-Based Environmental Performance Measurement (EPM) – Process involving the physical measurement, collection, communication, analysis, assessment and application of environmental measurement data and information.

Safety Management System (SMS) – System that provides the construct for the management of employee safety and health in an organization.

Scope, Coverage and Criteria Determination (SCCD) – Process encompassed in audit planning used to determine risk activities, areas and roles to be audited, and to determine the conditions against which to audit.

Self-Assessment Scheme – Tool to self-assess particular areas of performance

Supplier, Input, Process, Output, Customer (SIPOC) Analysis – Form of analysis used by the case utility to analyze and depict processes.

System-Based Environmental Performance Measurement (EPM) – EMS auditing designed to assess conformance to and the effectiveness of planned EM arrangements.

Voluntary Challenge and Registry (VCR) Program – Program under the Government of Canada's climate change efforts that is designed to challenge businesses and government agencies to voluntarily reduce and report on their greenhouse gas emissions

1.0 Introduction

1.1 EMSs and EPM

There is growing pressure on industries around the world to operate in an environmentally responsible manner. To deal with this pressure, many organizations have adopted standardized practices for environmental management (EM). The International Organization for Standardization (ISO) has developed a certifiable standard for environmental management systems (EMSs) under the title ISO 14001. Inherent to an EMS is the need to gauge performance as a basis for decision making, performance assurance, and improvement. There are essentially two forms of environmental performance measurement (EPM), namely result-based EPM and system-based EPM. Both have the same underlying goal to facilitate organizational direction and improvement.

1.2 Integration of EPM Systems in an Energy Utility

The core business of an energy utility is the generation, transmission and/or distribution of energy. A fully-integrated energy utility operates in all three sectors of the energy market. Energy utilities are heavily regulated and operate under intense scrutiny from a multitude of stakeholders. An EMS supported by EPM can be perceived as a tool to manage the environmental interactions of an energy utility. In Canada, as part of the Canadian Electricity Association's (CEA) Environmental Commitment and Responsibility (ECR) Program, all major electrical utilities have implemented EMSs consistent with the requirements of the ISO 14001 Standard.

The overall business management system of an energy utility can encompass a number of different discipline specific management systems including environmental, occupational safety and health (OS&H), quality, and corporate social responsibility. In line with improving management efficiency and effectiveness, overlaps and interdependencies between individual management systems induce a need to take advantage of possible synergy effects by seeking integrative approaches to management.

Generally, in an energy utility, result-based EPM is used in assessing regulatory compliance performance, in setting and assessing progress towards performance objectives and targets, and in gauging the use and effectiveness of EM controls. System-based EPM is used to assess whether an organization's EMS conforms to planned arrangements and is functioning effectively in achieving planned environmental objectives. There is overlap and interdependency between these two sub-systems of an EMS, and it is hypothesized that their integration can enhance EPM in the context of an energy utility.

1.3 Integrated EPM Applied to BP, EPR, and IMS

In a dynamic industry such as the energy industry, effective management and performance improvement require continuous planning and performance review. BP in energy utilities can be used as a driver for result-based EPM. It can be used as a basis for integrating planning and review elements for different management systems. The integration of EPM systems in an energy utility will affect BP processes, measurement activities, and structure.

Energy utilities will have certain external environmental performance reporting (EPR) programs. These reporting programs may be for the purposes of publicizing EM due diligence, satisfying regulatory and voluntary reporting commitments, benchmarking, or sharing best practices. Since an integrative EPM system model affects measurement activity and the flow of EPM data and information, EPR activity may be affected.

The concept of total quality management has evolved from satisfying customer requirements to delivering excellence to all stakeholders including customers, employees, government, the community, shareholders, and interest groups (Karapetrovic, 2003). With the wide scope of operations of a fully-integrated energy utility, EM is one of many priorities. An IMS serves to reduce redundancies in implementing individual systems by streamlining the functioning of the overall management system as a whole. An integrative performance measurement (PM) system could be perceived as a sub-system of an IMS. Joint audit systems can lead to cost savings, better allocation of resources, and a unified approach to problem solving that can lead to improvement of interlinked systems (Karapetrovic & Willborn, 1998b). This push towards integration creates a need to examine whether an integrative EPM system supports the integration of internal management systems and system assessment processes in an energy utility.

1.4 Organization of Thesis

Chapter Two presents a survey of existing literature to develop a background for issues and topics addressed in this thesis.

Chapter Three presents the conceptualization of a model for a Result-Enhanced Internal Management System Audit Program (REIMSAP) applied to EMSs in an energy

utility. The conceptualization includes discussion on a case specific EMS audit categorization scheme, as well as the presentation of a directory for suppliers needed to integrate result-based EPM considerations into EMS auditing.

In Chapter Four, the application of the REIMSAP model to BP and EPR is discussed. Conceptual models depicting REIMSAP integration with BP and EPR cycles are presented, followed by discussions on the resulting effects. The REIMSAP model is then analyzed as a basis for integrating management systems and supporting assessment methodologies. Conceptual models are presented depicting REIMSAP applied to the systems model for IMS and REIMSAP applied to an IMS in an energy utility.

Chapter Five presents a case utility analysis of REIMSAP application. The case utility's EPM systems are discussed and a gap analysis is presented. REIMSAP applicability to the case utility's existing audit functions, BP cycle, and EPR processes are analyzed. Finally, REIMSAP application for the integration of management systems is explored.

Chapter Six concludes the thesis with a summary of results and contributions of the research and a discussion on areas for future research.

2.0 Literature Survey

2.1 Introduction

A survey of existing literature has been conducted as a basis for research into the integration of result and system-based EPM in an energy utility. The following areas have been studied to support this research:

- The concept of an ISO 14001 EMS as it applies to energy utilities.
- The definition and rationale for result-based EPM in an energy utility.
- The basis for system-based EPM or EMS auditing in an energy utility.
- Integrated management system (IMS) theory as it applies to energy utilities.
- EPR in the energy industry.
- Issues facing the energy industry that have a bearing on this research.

2.2 ISO 14001 EMS in the Energy Industry

The energy industry has practiced some form of EM for decades; however, the inception of standardized frameworks for EM such as ISO 14001 and the European Union Eco-Management and Audit Scheme (EMAS) has been of particular importance. "Management systems formalize what may otherwise be haphazard initiatives. They provide focus and discipline, organization and structure" (Wright, 2000).

As it applies to organizations in general, the potential benefits to implementing a standardized EMS are as follows:

- Demonstrated commitment to environmental responsibility (Andrews et. al., 2002) and demonstrated compliance with regulations (Briffett et. al., 2000), which leads to a

reduction in the potential for legal liability (Andrews et. al., 2002; Sheahan et. al., 2001)

- Improved management control, establishment of systems that help cost efficiencies, and potential improvement of environmental performance (Andrews et. al., 2002; Sheahan et. al., 2001; Briffett et. al., 2000).
- Potential gain increase in competitiveness or increased access to markets (Sheahan et. al., 2001; Briffett et. al., 2000; Karapetrovic & Willborn, 1998a).
- Improvement of the organization's image and credibility (Sheahan et. al., 2001; Briffett et. al., 2000).
- Increased employee motivation (Andrews et. al., 2001) and increased employee involvement and education (Briffett et. al., 2000).

By the end of 2003, all Canadian Electricity Association (CEA) members, representing over 95% of the electricity generated in Canada, will be operating using ISO 14001, 1996, consistent EM practices and principles (CEA, 2002).

An EMS, as defined by ISO/DIS 14001, 2003, is the "part of the overall management system to develop and implement the organization's environmental policy and manage its relationships to the environment." According to the standard, a "management system includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources" and is a "system to establish policy and objectives and to achieve those objectives." The ISO 14001 EMS is a tool that provides a framework for the identification and control of environmental aspects, for the establishment of environmental policy, objectives and targets, and for the

review of the EMS to facilitate continual improvement of the system and the organization's environmental performance.

Environmental aspects can result in positive or negative impacts to the environment and must be identified before they can be managed (Wilson, 2002). Aspects can be seen as the sources of environmental impacts, and the relationship between them is cause-and-effect. A fully-integrated energy that specializes in generation, transmission and distribution of energy will have environmental aspects related to water flow management, air emissions, energy conservation and material use, land management, water quality management, the management of PolyChlorinated Biphenyls (PCBs), spills and unintended releases to the environment, waste management, and vegetation management.

2.3 A Result-Based EPM System in an Energy Utility

2.3.1 Definition and Rationale for Result-Based EPM

The management of a complex field such as the natural environment requires methods of representing issues in simple units of measure (Olsthoorn et. al., 2001). A PM system is an enabler for informed decisions and actions. It serves to quantify the efficiency and effectiveness of past actions through the acquisition, collation, sorting, analysis, interpretation, and dissemination of appropriate data (Neely, 1998).

ISO 14031, Environmental Management – Environmental Performance Evaluation (EPE) – Guidelines, defines EPE as "an internal process and tool designed to provide management with reliable and verifiable information on an ongoing basis to determine if an organization's environmental performance is meeting criteria set by the

organization's management" (ISO 14031, 1996). Note that EPE and EPM are used synonymously in this report. The ISO 14031 definition of EPE refers to a process comparable to the EMS process and a tool involving the application of environmental indicators (Jasch, 2000).

There are various motivations for the application of environmental indicators and the implementation of a result-based EPM system in an energy utility. According to the literature surveyed, the application of environmental performance indicators facilitates the following:

- Providing information to allow for internal goal setting, derivation of environmental targets, and controlling and monitoring related to environmental process, action, or service performance (Eckel et. al., 1992; Jasch, 2000; Thoresen, 1999).
- Identifying improvement opportunities through the comparison of performance results to expected conditions, over time, between firms and between internal business functions (Jasch, 2000; Thoresen, 1999).
- Highlighting optimization potentials and cost reduction opportunities (Jasch, 2000).
- Communicating environmental performance information to stakeholders through environmental reporting (Jasch, 2000; Thoresen, 1999).
- Technically supporting an EMS such as ISO 14001 (Jasch, 2000).
- Regulating, controlling and monitoring of organizations carried out by international and national environmental authorities (Thoresen, 1999).

Neely, 1998, contends that reasoning for PM falls under one of four categories. These categories include checking position, communicating position, confirming priorities and compelling progress.

Finally, Dias-Sardinha and Reijnders, 2001, contend that the process of performance evaluation should check how the organization stands with respect to its strategic objectives. In their research, they have proposed six environment related strategic objectives of organizations to help guide EPM. These strategic objectives are presented in Table A1 in Appendix A.

2.3.2 The Result-Based EPM Process

There is no universally recognized and accepted model for EPM. A variety of frameworks for EPM have evolved. The frameworks are diverse because they have been developed by people with distinct purposes and who come from a variety of different organizational, social, economic and environmental contexts (Bennett, 1999).

In 1999, the International Organization for Standardization (ISO) introduced a guidance standard entitled "ISO 14031 Guidelines for EPE" to complement the ISO 14000 series. ISO 14031 is an optional add-on to ISO 14001 and has been written so that it can be used without the application of a formalized EMS (Gelber et. al., 2000). It is a standard for the application of EPE that uses key performance indicators within a framework that outlines the collection, analysis, assessment, reporting and review of data (Gelber et. al., 2000). Figure A1 in Appendix A illustrates the EPM process defined in ISO 14031.

ISO 14031 defines two types of environmental indicators, namely, environmental performance indicators (EPIs) and environmental condition indicators (ECIs). "EPI are a type of environmental indicator used in relation to the organization's management and operations" (ISO/CD 14031, 1996). EPIs encompass management environmental

performance indicators and operational environmental performance indicators. "ECI are a type of environmental indicator used to describe the local, regional, national or global condition of the environment in relation to the organization" (ISO/CD 14031, 1996). Examples of EPIs and ECIs that may be used in an energy utility are listed in Table A2 in Appendix A. ISO 14031 describes the nature of data for environmental indicators as being absolute, relative, normalized or indexed, qualitative, aggregated, or weighted. Table A2 provides an example of these nature categories.

ISO 14031 has been criticized because it does not stipulate minimum performance standards or specific reporting requirements (Gelber et. al., 2000). Bennett and James, 1998, summarize five gaps of ISO 14031 as limited emphasis on standardization, limited emphasis on implementation, excessive complexity, no reference to external communication, and no linkages with the broader issues of sustainable development. ISO 14031 is not case specific and is broadly applicable to all types of organizations. A standard can never describe best practice, but can establish what is good enough (Uzumeri, 1997). ISO 14031 leaves much to interpretation on methodological aspects of EPM, and it must be tailored to an organization's environmental interaction, structure and operations.

To illustrate the variation between and the generality of EPM process models, Figure A2 in Appendix A illustrates an EPM process model taken from Kuhre, 1998, as referenced by Tam et. al., 2002. It is important to note that both the ISO 14031 model and the model presented in Figure A2 are generic models that encompass evaluation of performance data and information, internal communication processes, performance

reporting processes, and the application of EPM for the purposes of EMS, EPM and/or environmental performance improvement.

There are many guidance standards, models and initiatives related to selecting environmental indicators and implementing an EPM system. Among these initiatives are ISO 14031, the Global Reporting Initiative (GRI), the Association of Chartered Certified Accountants (ACCA) report on environment related PM, EMAS, the World Business Council for Sustainable Development (WBCSD) report on eco-efficiency metrics, the National Round Table on the Environment and the Economy, the European Environment Agency (EEA) working paper on eco-efficiency indicators, and the World Resources Institute (WRI) report (Olsthoorn et. al., 2001). Other notables that were identified are the Global Environmental Management Initiative (GEMI) primer and survey of environmental performance metrics and Kaplan and Norton's balanced scorecard.

The focus of this research is not on the selection of environmental indicators, but on the application of environmental indicators. An effective EPM system in an energy utility should have a system or classification scheme for developing performance indicators; however, this is at the discretion of the energy utility in question since there is no single best EPM model and since EPM models may vary in terms of applicability.

2.4 A System-Based EPM in an Energy Utility

2.4.1 Definition

In the context of EM, system-based PM or assessment refers to EMS auditing. A generic audit is an "independent and documented system for obtaining and verifying audit evidence, objectively examining the evidence against audit criteria, and reporting

the audit findings, while taking into account audit risk and materiality" (Karapetrovic & Willborn, 2000). An environmental audit is defined by the International Chamber of Commerce (ICC) as:

"A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of helping to safeguard the environment by: (i) facilitating management control of environmental practices; and (ii) assessing compliance with company policies, which would include meeting regulatory requirements" (ICC, as cited by Maltby, 1995).

"EMS auditing is a concept that is underpinned by such a definition of environmental auditing, but is tied specifically to ISO 14001's procedures and standards for auditing" (Sheahan et. al., 2001). This statement is flawed in that ISO 14001 is not the only standard for an EMS. A company that is not registered to ISO 14001 could still have an EMS in place that could be assessed through EMS auditing. However, since the focus of this research is on EPM in an energy utility, and since all major electrical utilities in Canada are implementing ISO 14001 EMSs, this definition applies.

Management system audits are performed to verify that the applicable elements of a management system are appropriate and effective and have been developed, documented, implemented and maintained according to specified requirements (Russell, 2000). This statement is outdated since the current ISO 9001 QMS Standard is based on a process approach, not an element approach. Management system auditing should have an emphasis on assessing processes and process inter-linkages as a basis for system evaluation. The current international guidance standard for QMS or EMS auditing, ISO

19011, does not distinguish coverage differences based on different management system approaches (i.e. PDCA for EMS and process approach for QMS). A QMS and an EMS audit will vary in terms of scope, coverage, criteria, and auditor competency needs.

It is important to note the distinctions between, process based auditing, management system based auditing, and compliance auditing. Furthermore, it is important to distinguish between internal and external auditing functions. These distinctions are discussed in Appendix A Section 2.

2.4.2 Rationale for EMS Auditing in an Energy Utility

As part of an ISO 14001 registered EMS, EMS auditing function(s) are required to maintain registration. Aside from this requirement, the objectives and the potential benefits of EMS auditing drive the rationale for this function.

The ISO 19011 Guidelines for quality and/or environmental management system auditing specify that EMS audit objectives can include the following (ISO 19011, 2002):

- Determining the extent of conformity of the auditee's EMS, or parts of it, with audit criteria.
- Evaluating the capability of the EMS to ensure compliance with regulatory and contractual requirements.
- Evaluating the effectiveness of the EMS in meeting specified objectives.
- Identifying areas of potential improvement of the EMS.

EMS auditing is not necessarily limited to the above objectives; however, because ISO 19011 is an internationally recognized standard, it is assumed that the above objectives would constitute the most common EMS audit objectives. EMS audit objectives

identified by Campbell, as cited by Sheahan et. al., 2001, Russell, 2000, and Russell and Regel, 2000 can all be correlated to the ISO 19011 objectives. Environmental auditing objectives, such as those identified by Welford, 1994, deviate because they are not explicit to a management system; however, if the concept of EMS auditing is underpinned with that of environmental auditing, the scope and coverage of an EMS audit could be expanded to accomplish environmental audit objectives as the situation or audit clients dictate.

Potential benefits of environmental and EMS auditing identified in the literature are as follows:

- Can serve to demonstrate company commitment to environmental protection to employees, the public and the authorities (Vinten, 1996), thereby improving public image (Welford, 1994).
- Can serve to verify compliance with local and national legislation, which can reduce exposure to litigation, incidents and adverse publicity (Vinten, 1996; Welford, 1994), facilitate insurance coverage (Holdsworth as cited by Maltby, 1995), and reduce the enforcement burden of regulators (IISD, 1996).
- Can increase employee awareness of environmental matters (Vinten, 1996; Holdsworth as cited by Maltby, 1995; Welford, 1994) and can serve to assess and facilitate training programs (Vinten, 1996).
- Enables companies to build on good environmental performance and give credit where appropriate, and can provide early warnings of EM and environmental performance deficiencies (Vinten, 1996; Holdsworth as cited by Maltby, 1995).

- Can identify where potential environmental improvements and efficiency / cost savings can be achieved (Vinten, 1996; Holdsworth as cited by Maltby, 1995; Welford, 1994), thereby contributing to improved environmental and business performance (IISD, 1996).
- Tests environmental performance against aims and intentions (Holdsworth as cited by Maltby, 1995) and provides assurance that policy objectives and targets are being managed (IISD, 1996).

2.4.3 The EMS Auditing Process

EMS auditing evolved from the concept of environmental auditing, the field QMS auditing, and with the proliferation of EMS standards. The evolution of auditing standards has served to highlight certain audit fundamentals or principles, which have been identified by ISO 19011, 2002, Russell, 2000, and Karapetrovic and Willborn, 2000.

ISO 19011, 2002, is an international auditing guidance standard applicable to both quality management system (QMS) and EMS auditing. It was preceded by similar national guidelines in North America, the UK, and within the North Atlantic Treaty Organization (NATO) (Karapetrovic & Willborn, 1998a). It replaces discipline specific management system auditing guidelines that were directly linked to ISO 14001 EMS and ISO 9001 QMS implementation. ISO 19011 presents guidance related to managing an audit program, generic audit activities, and auditor competency and evaluation. It is a step towards the harmonization of current auditing standards and the integration of internal management systems (Karapetrovic, 2002).

The audit process is the "flow of activities from the conception of an individual audit to the evaluation of the audit to determine whether set objectives were achieved" (Karapetrovic & Willborn, 2000). According to Karapetrovic and Willborn, 2000, once the audit process has been initiated, audit objectives, scope and criteria are identified, provisions are made for audit management, and general timeliness and the required extent of resources are identified. The audit process then seeks to confirm through evaluation audit feasibility and auditor competency. The audit is then planned, audit teams are allocated and audit activities are assigned.

Audit execution follows a "well-known sequence of opening meeting, collection and verification of audit evidence, comparison of audit evidence against audit criteria, summary of audit findings, and closing meeting" (Karapetrovic & Willborn, 2000). Audit reporting follows the audit execution phase and audit follow-up is then initiated. Depending on the situation, follow-up action may or may not be considered as part of the audit. For example, with registration audits, a non-conformance conclusion may require action to maintain registration. The follow-up actions may then be audited as part of a subsequent audit or to close-out the audit that originally identified the non-conformance.

There are auditee and auditor responsibilities related to audit follow-up. Regel and Russell, 2000, contend that the implementation of corrective and/or preventive action should be verified through checking for effectiveness (i.e. action achieves the desired result and the process is capable and efficient), monitoring (i.e. identify measures to be monitored as a basis to verify that the action worked), and follow-up (i.e. auditor verification through follow-up audit or analysis of results). They propose a process model entitled the "audit function improvement process" for audit follow-up.

The audit process as it pertains to an energy utility will be discussed in subsequent chapters. The reader is referred to ISO 19011, 2002, and the Quality Audit Handbook (Russell, 2000) as reference guides for management system auditing practices.

2.5 Integration of Management Systems in an Energy Utility

2.5.1 Definition

There is no single internationally accepted definition for an integrated management system (IMS). There are varying interpretations of what integration means and how it should be accomplished, which has led to an urgent need for definitions (Dale & Wilkinson, 1999). An integrated system implies that two or more individual systems have been linked in a manner resulting in a loss of interdependence of one or more of the individual systems (Karapetrovic & Willborn, 1998b). Applying systems thinking, "an IMS is conceptualized as a single set of interconnected processes that share a unique pool of human, information, material, infrastructure and financial resources in order to achieve a composite set of goals related to the satisfaction of a variety of stakeholders" (Karapetrovic, 2003).

Early literature on IMS focuses primarily on the integration of quality and environmental management systems and the compatibility of associated management system standards (e.g. Beechner & Koch, 1997; Karapetrovic & Willborn, 1998b; Block & Marash, 1999), while more recent literature has expanded focus to include OS&H management (e.g. Jonker & Karapetrovic, 2004; Wright, 2000; Winder, 2001). Other management systems covering areas such as corporate social responsibility do exist and can fall under the scope of an IMS, but are rarely discussed in IMS literature. As a result

of the proliferation of various function specific management systems and standards, the goal of an IMS is to integrate common elements of management systems to eliminate redundancies and take advantage of possible synergy effects (Karapetrovic, 2002).

Integrating management systems and integrating management system standards are distinct issues (Jonker & Karapetrovic, 2003). The integration of management system standards requires the efforts of a standard setting body such as ISO and involves the development of a generic management system standard. There is no internationally recognized generic management system standard; however, there have been national integrative standards developed in Norway (NTS, 1999) and Australia (AS/NZS, 1999), which cover quality, environment, and OS&H management. An integrated management system standard is not a requirement for the successful implementation of an IMS (Karapetrovic, 2002). Standard users require a model that can facilitate the inclusion of any management system standard and can harmonize the diverse requirements of such standards (Jonker & Karapetrovic, 2004).

The focus of this research is the integration of two common management system elements as a partial basis for the integration of internal management systems in an energy utility. Specifically, monitoring and measurement and auditing have been researched in the context of an EMS. As a basis for IMS theory proposed in this research, parallels will be drawn from environmental to other management systems.

2.5.2 Rationale for an IMS in an Energy Utility

The literature is consistent in terms of the reasoning for the evolution of the IMS concept. The concept of quality has evolved from being driven exclusively by customer

satisfaction towards involving all interested parties including customers, shareholders, employees, and the community. Competitive pressure from multiple stakeholders has led to the development of a multitude of function or stakeholder-specific management systems and associated standards that deal separately with quality (ISO 9001, 2000), environment (ISO 14001, 1996), OS&H management (BSI – OHSAS 18001, 1999), and other areas (e.g. SA 8000 Social responsibility standard). Due to logical overlaps between management system functions and commonalities between management system elements and management system standards, the concept of IMS was born.

The implementation of an effective IMS in service firms, such as an energy utility, is aimed at improving management practice and the efficiency of separate management systems by providing a more consistent and coherent overall system to direct and streamline organizational operations (Karapetrovic & Willborn, 1998c). An IMS in a service organization provides "opportunities for improved service performance, customer satisfaction, productivity, efficiency and market share" (Karapetrovic & Willborn, 1998c). In the context of organizations in general, other key potential benefits of an IMS are presented in Appendix A Section 2.

In the context of an energy utility, the foremost advantages of an IMS relate to the potential for internal management efficiency gains and higher transparency. With the multitude of regulatory restrictions imposed on an energy utility, there is a need to integrate compliance control. Finally, having an IMS that covers quality, environmental, safety and health, and social accountability management system standard requirements can be perceived as a step towards business excellence (Karapetrovic, 2003).

2.5.3 IMS Considerations and Models

Jonker and Karapetrovic, 2004, contend that solutions directed towards facilitating the integration of management systems in organizations have to contain two parts including a model and a methodology. The IMS model should analyze, harmonize, align and integrate specific standard requirements. The IMS methodology supports the model and guides an organization towards the integration of internal management systems (Jonker & Karapetrovic, 2004).

Since the concept of IMS is relatively recent, IMS models are not abundant in the literature surveyed. One notable IMS models that could apply to an energy utility is presented by Jonker and Karapetrovic, 2004. They suggest a systems thinking approach to integration and present the systems model for IMS. This model is illustrated in Figure A3 in Appendix A.

Jonker and Karapetrovic, 2004, state that an IMS model should be, at a minimum, generic, able to incorporate all of the common elements of function specific management systems, flexible and able to meet specific management system requirements, fully compatible with function specific management system standard models (i.e. Process approach for ISO 9001 and Plan-Do-Check-Act approach for ISO 14001), and supportive of related methodology to implement, assess, maintain and improve an organization's IMS. They argue that the systems model for IMS meets all of these criteria.

An IMS should not be developed from scratch (Winder, 2001). Management systems share a common core. Policy, planning, implementation and operation, performance assessment, improvement and management review are core elements of any management system (ISO Guide 72, as cited by Jonker & Karapetrovic, 2004).

IMS methodology should address the path to be taken to build an IMS in an organization; however, with the multitude of factors that differentiate businesses, it is not possible to develop a methodology applicable to all cases. Considerations that are governed by case specifics are presented in Appendix A Section 2. It should be noted that an energy utility presents an atypical case for integration in that an "EMS first followed by other management systems" sequence to integration can apply.

A case should be made regarding the integration of management system supporting methodologies such as auditing. The integration of internal management systems requires that system assessment methodologies are also aligned (Karapetrovic, 2002). Karapetrovic and Willborn, 1998a, argue for a two-pronged approach to integration where the first prong involves the development of a generic management system standard and a methodology for IMS and the second prong involves the development of a generic audit system standard and a methodology for an integrated audit system. What is lacking most is the methodology to support integration.

For further information on systems thinking and its application on IMS theory, the interested reader is referred to Karapetrovic & Willborn, 1998b and 1998c; Karapetrovic, 2002; and Jonker & Karapetrovic, 2004. For a comprehensive examination of IMS literature and theory, the reader is referred to Dale & Wilkinson, 1999.

2.6 EPR in the Energy Industry

EPR in an energy utility can take on a variety of different forms depending on ownership structure, size, imposed regulations, geographic location, pressures from stakeholders and interested parties, and incentives to disclose. There are two types of

EPR in an energy utility, specifically, required EPR and voluntary EPR. Disclosure of environmental performance information depends on a firm's assessment of its investor's information needs and media exposure (Cormier & Magnan, 2003).

EPR in the energy industry is not standardized. In their study of the environmental and social reporting strategies of three Canadian electric utilities, Cormier and Gordon, 2001, found that the publicly owned firms disclosed more social and environmental information than the privately owned firm. Additionally, they found that larger firms disclose more than the smaller firms due to visibility and accountability issues (i.e. larger company more visible and likely to face political and lobbying action).

It is important to note the motivations behind EPR as a basis for variation in the reporting initiatives of energy utilities. Interest groups, stakeholders and society influence the types and timings of an energy utility's environmental disclosures. Under legitimacy theory, "a firm's long-term existence depends upon its ability to legitimize its activities to society within the context of an implicit social contract" (Cormier & Magnan, 2003). Therefore, environmental reporting can be perceived as a means to manage public impressions. Environmental reporting can enhance a company's transparency and credibility, and can reduce the risk apprehensions of investors (Cormier & Magnan, 2003). Public perception and risk apprehensions are variables; hence, different utilities may need to address different environmental performance issues through reporting. Voluntary reporting helps companies measure current impacts, formulate targets for improvement, and communicate seriously with customers, communities, governments, financial markets, and other stakeholders (Andrews & Slater, 2002).

EPR is accomplished through different formats. Mandated EPR will typically have defined PM and information requirements. For example, energy utilities in Canada, among other companies, are required to report information on releases and transfers of pollutants to the Government of Canada on an annual basis as legislated under the Canadian Environmental Protection Act, 1999. Inventory information on pollutants is included in the National Pollution Release Inventory (NPRI), which is a legislated and publicly accessible database for identifying and monitoring sources of pollution in Canada (Environment Canada, 2004).

With voluntary disclosure of environmental information, a company must trade-off the costs of disclosing potentially damaging information with the potential advantages of expanded disclosure (Cormier & Magnan, 2003). A voluntary environmental performance report may address the information needs and expectations of various stakeholders and interest groups. It may be used for the purposes of benchmarking and internal planning, or to demonstrate commitments as a basis for recognition and promotion. Finally, voluntary reporting may simply be within the best interest of the company due to industry and social pressures. As an example of a voluntary EPR initiative, an energy utility could choose to produce a sustainable development report. The interested reader is referred to the Global Reporting Initiative (GRI) Sustainability Reporting Guidelines, 2002, for information on the elements of sustainability reporting.

There is currently no generic international standard for EPR. ISO is currently working towards developing ISO 14063, Environmental Management – Environmental Communications – Guidelines and Examples, which should assist organizations in

determining whether to voluntarily disclose information to external individuals and groups (Block, 2002).

2.7 Issues Facing the Energy Industry Related to this Research

There are many critical issues facing the energy industry ranging from deregulation to increased scrutiny on business conduct in areas such as environmental and social management. This section aims to briefly address certain critical issues that apply to this research. For expanded discussion on these issues, refer to Appendix A Section 2.

There is a multitude of factors that differentiate energy utilities and the environment in which they operate. Energy regulations vary by geographic location. In certain areas of the world, the electricity industry has undergone major restructuring or deregulation where companies and public utilities that once operated as monopolies for generation, transmission and distribution of electric power now face competition from various sources (Kaplan, 1998). In the U.S. and Europe, electric industry restructuring is motivated by the recognition that competitive markets produce better results for national competitiveness, industry participants, and consumers than rigid regulated monopoly structures (Carson, 1998).

Another major issue facing the energy industry is sustainability, which has emerged as a global issue. Sustainable development refers to "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, as cited by McDonach & Yaneske, 2002). Sustainability can be perceived as a balance between ecological concerns and mankind's socio-

economic activities; however, there is uncertainty in terms of what this balance is and whether needs have been compromised (McDonach & Yaneske, 2002). Energy utilities interact with environmental, social and economic dimensions of sustainability (WBCSD, 2002). Sustainability is a broader concept than EM, which can be perceived as a partial basis for environmental sustainability. Sustainability applies to this research in that energy utilities will have various stakeholders, objectives, strategies, and initiatives related to the dimensions of sustainability. Additionally, it can be perceived as a driving force behind IMS efforts.

There is a strong link between sustainability applied to the energy industry and managing greenhouse gas (GHG) emissions. Over the past decade, GHG emissions and the effects of global warming have received attention on a global scale. Energy utility operations contribute to the overall GHG emission problem primarily through fossil-fuelled generation. An electric utility can serve to reduce GHG emissions by displacing or switching fossil-fuelled generation with cleaner, more efficient and more renewable sources, and by implementing demand and supply-side energy efficiency and alternative energy strategies (Government of Canada, 2001). The issue of GHG emissions and climate change applies to this research in that it is a driving force behind certain energy utility environmental strategies and actions, and it may form the rationale for specific integration, measurement and reporting activities.

The electricity industry in Canada has a national industry association through the Canadian Electricity Association (CEA). The CEA is involved in identifying and monitoring critical issues facing the electricity industry, and it aims to lead the development of pro-active industry responses to such issues (CEA, 2004).

As a response to environmental concerns, the CEA introduced the Environmental Commitment and Responsibility (ECR) Program. Participation in the ECR Program is a mandatory requirement for CEA membership. This program is a public commitment by CEA members to continue to provide economical and reliable electricity while continually reducing impact on the environment (CEA, 2004). It is an industry-wide approach to EPR for the corporate utility members of the CEA (ECR Annual Report, 2002). The ECR Program is guided by four core principles, and it requires members to monitor and report on sixteen related performance indicators. When the ECR Program was introduced, members made a commitment to develop and implement EMSs conforming to the ISO 14001 standard. As a result, "the ECR Program has been a major driver of EMS implementation for many utilities" (ECR Annual Report, 2002).

As it applies to this research, the ECR Program is leading to a consistent approach to EM in Canadian electric utilities. Additionally, the ECR Program underpins various electric utility strategies and initiatives that drive specific EPM and EPR activities.

2.9 Motivations for Proposed Research

Motivations for this research stem from two categories including theoretical and practical motivations. From the theoretical or academic side, motivations include the following:

- No literature has been found dealing explicitly with the integration of result-based EPM with EMS auditing.

- There is a limited number of IMS models in literature, these models are broadly applicable, and only two articles were found (see Beckmerhagen et. al., 2003 and Burns et. al., 1997) with focus on IMS within an energy industry context.
- Existing IMS literature touches very little on the methodological aspects of integration.
- An energy utility presents an atypical case for IMS research in that the an "EMS followed by other management systems" sequence to integration can apply.
- Literature on EMS auditing is broadly applicable, and no literature was found on EMS auditing within the context of an energy utility.

From a practical side, motivations for this research include the following:

- Energy utilities operate under a multitude of environment and safety regulations, which creates pressure on management to maintain and improve compliance measurement and assessment systems.
- Stakeholder expectations on an energy utility create a need to develop and build upon PM systems as a basis for improvement.
- The effects of industry restructuring create pressure to integrate management systems to take advantage of potential efficiency gains.
- The numerous stakeholder specific management systems and standards that apply to an energy utility induce a need for integration efforts.
- The case utility is currently experiencing major growth and reform, and it is particularly interested in this research because it is seeking direction on integrated systems that are suitable to all facets of the organization.

- The case utility is interested in this research as a basis for streamlining its EPR activity and identifying deficiencies in existing EPM systems.

2.9 Objectives of Proposed Research

The objectives of the proposed research can be described as follows:

- To conceptualize a model for the integration of result and system-based EPM in the context of an energy utility with the aim of furthering knowledge on IMS methodology.
- To examine the application of the conceptualized model under the scope of a case utility with the following intentions:
    - ► To assess how the conceptualized model can be integrated with BP processes.
    - ► To determine how the conceptualized model applies to EPR.
    - ► To identify gaps between the proposed model and case reality in order to facilitate the development of strategies for the integration of management system elements and supporting tools.
- To theoretically determine, using case utility analysis, whether the integration of result and system-based PM processes facilitates the integration of internal management systems in an energy utility setting.

3.0 REIMSAP - Model Conceptualization

3.1 Introduction

This chapter presents the conceptualization of an integrative model for result and system- based EPM applicable to an energy utility. The model conceptualization, as proposed in this research, encompasses the following components:

- Model conceptualization methodology.
- Discussion on the linkages between result and system-based EPM.
- Presentation of conceptual model for integrated EPM (REIMSAP).

Subsequent sections are dedicated to the discussion of these components.

3.2 Methodology

Internal EMS auditing has been selected as the basis for the development of a conceptual integrative model for result and system-based EPM is an energy utility. The reasons for this are the following:

- ISO 19011 Guidelines for EMS auditing leaves much to interpretation (i.e. ISO 19011 lacks certain internal EMS auditing case specific and methodological detail) and an internal EMS auditing program can be customized within an energy utility.
- Result-based measurement activities cannot all be standardized within an energy utility and there may be variation between different business areas and at different levels. Attempts to tie EMS auditing into all EPM activities does not seem viable.
- The generic result-based measurement process follows a plan-do-check-act cycle, which is not new to the academic field and leaves little room for manipulation and development of an academically value-adding model.

- The literature survey has led to the conclusion that, currently, there is no research being conducted on the integration of result-based EPM and EMS auditing.
- The literature survey has identified that much more literature already exists on case specific result-based EPM in comparison to case specific EMS auditing.

The conceptualization of the integrated EPM model has been partially based on the study of literature related to EPM. Specifically, the model encompasses the audit activities outlined in ISO 19011.

The model is also partially based on a study of existing EPM practices in the case utility. It highlights case specifics related to the flow and responsibilities for audit activities. As an example, the EMS audit program in the case utility involves active audit clients and non-active audit clients. The active audit client for the EMS audit program is the Corporate Environmental Management Review Committee (Corporate EMRC). The Corporate EMRC serves as an advisory function to the Executive Management Committee on environmental management matters. Due to this role, it provides audit program parameters for the EMS audit program. Non-active clients include the Internal Audit Review Committee (IARC) and the Audit Committee of the Board of Directors. Non-active clients have a vested interest in the audit plans and results, but are not necessarily in a position to provide ongoing informed direction for the audit program.

Finally, the model is partially based on what the author has conceptualized to be the "idealized" process for integrative EPM. For example, in the model, audit planning has been designated the scope, coverage and criteria determination (SCCD) process. Within this process, there are formalized consultation meetings with EPM filter personnel

throughout the energy utility as a basis for the Lead Internal EMS Auditor to determine the ideal EMS audit scope, coverage and criteria.

3.3 Linkages between Result and System-Based EPM

To integrate result and system-based EPM in the context of an energy utility, there is a need for a transparent and effective result-based EPM network that drives the flow and application of EPM throughout the energy utility. For discussion on the result-based EPM network in an energy utility, refer to Appendix B Section 1. From this discussion, it is important to note that model conceptualization assumes an organizational structure with high level business units covering generation, transmission and distribution, corporate service, customer service and marketing, and finance and administrative responsibilities.

In addition to the result-based EPM network, an EMS audit program is necessary for integrative EPM. For discussion on the EMS audit program organizational structure in an energy utility, the reader is referred to Appendix B Section 2. For discussion on EMS audit process sequence and activities, refer to Appendix B Section 3.

Within the EMS auditing context, the main area for integration between result and system-based EPM is audit planning. To lesser degrees, result-based EPM factors into audit execution and follow-up. Specifically, within the planning stages for an internal EMS audit, there are certain internal filter points to be contacted as sources for EPM consideration to be factored into the audit plan. These filter points may include Environmental Performance and EMS Coordinators, the OS&H Department Manager,

operational and emergency control leads, specific division and department managers, and internal experts on specific fields.

In addition to communications with the result-based EPM filter personnel, auditor consideration of BP documentation, EMS review process documentation and the status of follow-up actions all provide points for result-based EPM input into EMS audit planning. Result-based EPM data and information facilitates decisions or recommendations stemming from business plan and EMS review processes.

Audit follow-up should involve result-based EPM undertaken by the business areas responsible for implementing follow-up action. If follow-up implementation and performance accountability roles differ, this EPM data and information should be transferred to the personnel accountable for follow-up action performance. This personnel should be communicating with the Internal Audit Department (IAD) to provide assurance and evidence, as necessary, that the follow-up actions are effective and occurring according to defined plans.

Integration of result and system-based EPM should also take place within the overall management of the audit program. Commitment to continual improvement of the EMS implies a commitment to improvement of the audit program. Therefore, some form of result-based PM should take place through the IAD. This could be accomplished through a self-assessment framework. Indicators of performance could include the following:

- Measures based on the follow-up actions (e.g. number of recommendations leading to follow-up action, number of follow-up actions accomplished according to plans versus total to be implemented and monitored for performance…etc.).

- Measures based on the timeliness of audit execution and reporting (e.g. number of audit reports distributed on time according to audit plans, number of follow-up action plans received on time according to a submission timeline, % of schedule requirements met…etc.).
- Measures based on the accomplishment of audit objectives (e.g. % of audit objectives met).

This self-assessment process should lead to the identification of opportunities for improvement of the audit program. Result-based PM by the IAD could be complemented by consultation with external EMS auditing consultants who could objectively assess the effectiveness of the audit program and provide further recommendations.

The following sections are dedicated to presenting and describing an integrative model for EPM.

3.4 REIMSAP Applied to an EMS in an Energy Utility

The proposed model is titled the Result-Enhanced Internal Management Systems Audit Program (REIMSAP) model applied to an EMS in an energy utility. A key concept behind the model is that an internal EMS auditing program and individual EMS audits can be categorized into a series of components or overlapping parts based on scope and coverage. The components should be mixed and matched to provide a value-adding representative sample for an internal EMS audit. Based on these components, reference can be made to result-based EPM responsibility and activity. The REIMSAP model is supported by a discussion on the potential components that can make-up the whole of an internal EMS audit plan. It highlights the suppliers for the internal EMS audit SCCD

process needed to integrate result-based EPM into the EMS audit planning. Finally, the model is supported by guidelines and suggestions for coverage and scope components that are tailored to the EMS activities and frameworks within energy utilities. To begin, Table 3-1 highlights the potential EMS audit components that serve to define audit scope and coverage for an internal EMS audit in an energy utility. Note that audit scope defines the boundaries of the audit in terms of business areas, locations and/or personnel to be audited. Coverage defines the activities, processes, elements and controls to be covered in the audit.

The following sub-sections are dedicated to briefly describing and providing guidelines for the two EMS audit scope components with reference to the various coverage components. For expanded discussion on these scope components, see Appendix C. The internal EMS audit scope and coverage components in Table 3-1 are a contribution of this research in that no other audit categorization scheme was found in the literature. Supporting discussion and guidelines are also contributions in that they reinforce this case specific audit categorization scheme. This categorization scheme is based on the case utility analysis (see Chapter 5) and the author's conception of internal EMS auditing in an energy utility.

Table 3-1: Potential Internal EMS Audit Scope and Coverage Components

Internal EMS Audit Component:	General Description:
Audit within Functional Business Areas and/or Geographic Locations (Audit Scope Component)	Auditing within a defined business area and geographic location with specific EMS planning, operation, maintenance or other responsibilities (e.g. Apparatus Maintenance Division, Hydro-electric generating facility in the northern part of the Province…etc.). May be based entirely on function rather than function and location
Audit of Functional Personnel (Audit Scope Component)	Auditing of specific employees based on their functions and interfaces within the company (e.g. Program Manager for specific EMS Program, Environmental Performance Coordinator (EPC), Corporate Hazardous Waste Lead…etc.) Auditing based on the functions and interfaces of a specific working group, committee or functional team of employees (e.g. Business Unit EPM Team)
Audit Coverage of Specific EMS or SMS Program (Audit coverage component)	Auditing to assess the implementation and effectiveness of a specific EMS or SMS related program (e.g. Spill prevention program) Auditing to assess adherence to defined controls, procedures and requirements applicable to a specific EMS or SMS related program
Audit Coverage of BP Processes (Audit coverage component)	Auditing of the BP processes to assess EMS related planning and measurement, the achievement of environmental targets, and the effectiveness of environmental objectives and programs
Audit Coverage of Operational Control and Emergency Control Frameworks (Audit coverage component)	Auditing of operational or emergency control frameworks to assess adherence to defined requirements and procedures and to assess the maintenance of operational and emergency control related requirements and documentation (e.g. Audit of transportation of dangerous goods control framework)
Audit Coverage of Regulatory Compliance Control Frameworks and Issues (Audit coverage component)	Auditing based on regulatory compliance controls (e.g. self-assessment process for regulatory compliance) to assess adherence to and the maintenance of control requirements and procedures Auditing based on regulatory issues such as a non-compliance citation received from a regulator
Audit Coverage of Emerging Risk or Issue Affecting the Operation of the EMS (Audit coverage component)	Auditing to assess how changing issues have been factored into EMS planning, implementation and maintenance
Audit Coverage of EMS Management Review Process (Audit coverage component)	Auditing to evaluate the effectiveness of the EMS Management Review processes
Audit Coverage of EMS Audit Follow-up Action (Audit coverage component)	Auditing to assess the status and effectiveness of audit follow-up actions and adherence to follow-up action plans
Audit Coverage of EMS Supporting Controls such as Software (Audit coverage component)	Auditing to assess the use and effectiveness of EMS supporting control systems such as tracking databases for training and/or measurement data recording

3.4.1 Audit Scope Based on Function and/or Location

With the exception of the coverage based on EMS management review processes, any one of the EMS coverage components described in Table 3-1 can fall under the scope of auditing within a functional business area and geographic location. Internal EMS auditing may be scoped according to business area and geographic location, or according to the business area without reference to geographic location. Auditing based on functional business area and geographic location cannot define the entire scope of the internal EMS audit. There need to be scope sub-components to define the actual auditees (i.e. auditees are people, not locations). For example, if an EM program is being audited within a functional business area based on location, then a scope sub-component would include functional employees connected to the implementation of said program. Although the primary scope of the internal EMS audit may be within a functional business area, the interfaces of the business area also need to be assessed. Audit activity should not be confined to the boundaries of a department without considering cross functionality of activity and the flow of direction and information.

It is possible to assess the majority of ISO 14001 elements in a business area based on function and geographic location; however, certain elements take priority based on risks and certain elements are key at different organizational levels. Key points to assess at different levels are presented below and are based on the case utility analysis interview process (see Chapter 5).

At an employee level, key points to assess include the following:

- Awareness of and adherence to operational control, emergency control, regulatory compliance control, and other control frameworks (e.g. processes and codes of practice).
- Knowledge of communication links related to emergency response situations, environmental concerns, and any relevant result-based EPM activities including those for programs and regulatory compliance.
- Knowledge of designated responsibilities under the scope of the EMS including program implementation responsibilities and awareness of program performance criteria.
- Evidence of adequate training being provided to ensure competence related to managing the potential environmental risks inherent in performing designated responsibilities.

At a departmental management level, key points to assess include the following:

- Awareness of environmental aspects, potential impacts, and environmental and safety risks under their scope of management.
- The BP processes and associated interfaces. May include management's awareness of performance related to defined objectives, targets, programs, and corrective and preventive actions.
    - ► May include assessment of considerations for environmental BP.
    - ► May include assessment of linkages to higher-level BP processes.
- Awareness, maintenance and use of EM controls. May include assessment of the use of regulatory compliance control processes such as self-assessments measurement

schemes to provide assurance on compliance and a basis for planning corrective or preventive actions.

- Knowledge of internal and external communication interfaces related to EMS planning and action.
- The maintenance and communication of EMS and SMS requirements, operational control requirements and documentation, and emergency response plans.
- Evidence of maintained EMS related records and documents.

At a divisional management level, EM controls are not as important in comparison to a departmental management level. The reason for this is department managers are responsible for communicating and deploying control requirements to staff, assessing control performance, and providing feedback to control leads and divisional management. At a division manager level, there should be evidence that feedback is being provided from department managers on controls for planning purposes and to assure adherence to the requirements upon which they are built.

At a division manager level, it is important to assess whether EPM data and information is flowing effectively up and down the organizational ladder. Internal communication is a key element to assess based on the responsibilities of a division manager. Division managers should have an awareness of performance related to environmental objectives, targets, programs and local improvement initiatives within their area of management. They should be able to provide evidence that such performance is factoring into business area decision making. Furthermore, with direction and input flowing from higher organizational levels, division managers will have

planning and delegation responsibilities, as well as performance accountability for certain initiatives and controls under their area of management.

3.4.2 Audit Scope Based on Personnel

In addition to defining the areas and locations to be audited, audit scope should define the auditees or people to be audited. People drive the implementation of an EMS and, as depicted through proposed EPM structures and processes for energy utilities, there are filter points for the flow of EMS related data, information and decision making. Before an audit can be fully scoped and planned, the Lead Internal EMS Auditor needs to consult certain filter point personnel. The filter personnel represent the strongest link for the integration of system and result-based EPM. The filter personnel can direct the Lead Internal EMS Auditor to further communication links depending on the desired coverage components of the EMS audit. The Environmental Performance and EMS Coordinators, OS&H Department Manager, operational and emergency control lead personnel, internal experts on specific fields, and management at divisional and departmental levels can all provide some insight into what should be assessed, who should be audited, and the criteria against which to assess systemic performance.

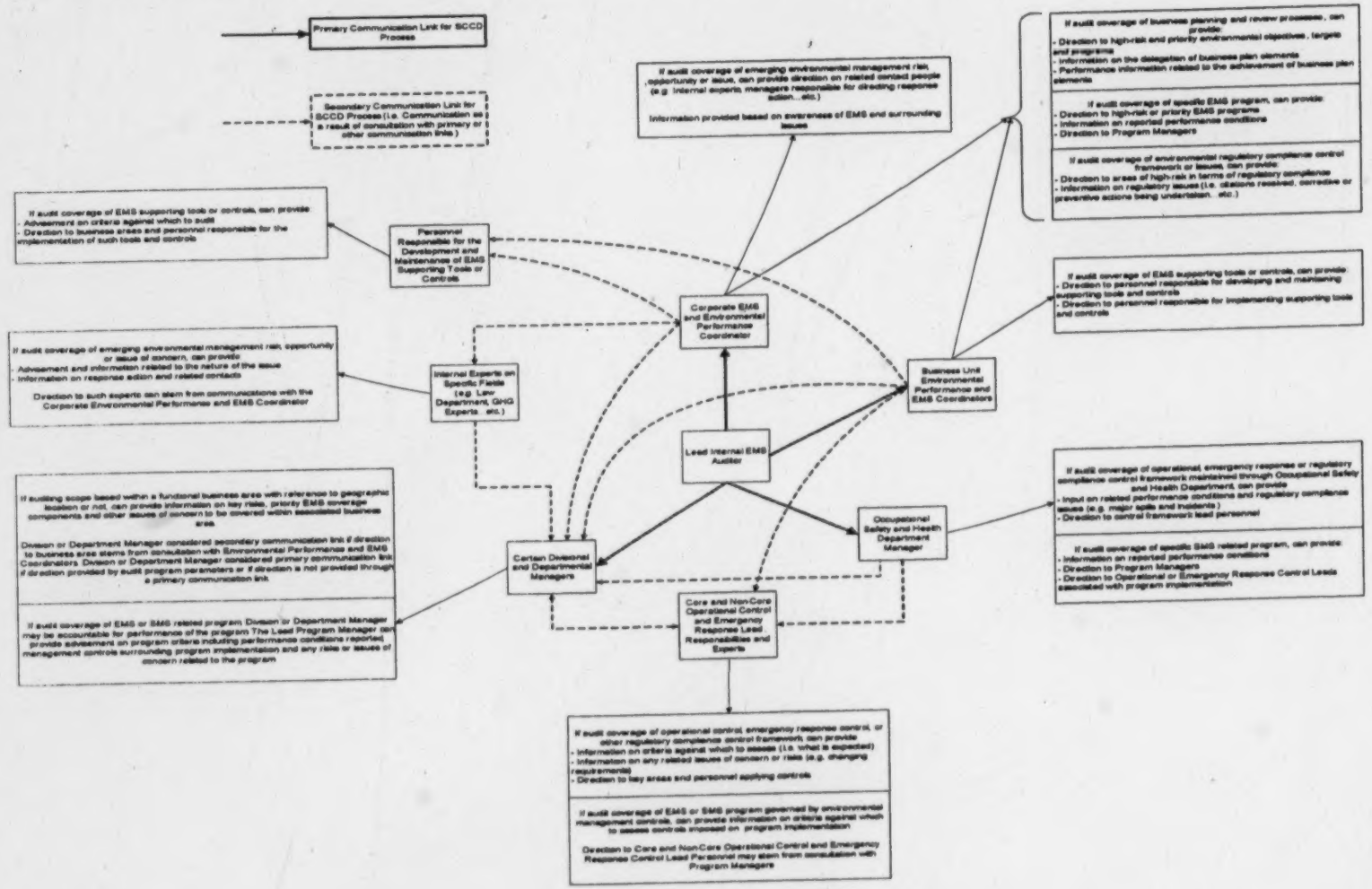
Based on the expanded discussion of audit scope based on personnel in Appendix B Section 4, Figure 3.1 describes the proposed internal communication links or suppliers for the internal EMS audit SCCD process. Figure 3.1 is a supporting directory for the EMS audit SCCD process that forms a part of the REIMSAP model applied to an EMS in an energy utility.

Appendix D comprises eight tables (Tables D1- D8) describing the rationale for potential auditees under each coverage component presented above. Each table is supported by suggestions on what is key to assess under the coverage component and a listing of ISO 14001 elements that can be covered under each coverage component.

It is important to consider the overlapping of the proposed scope and coverage components to eliminate duplication effort in auditing. For example, if there is internal EMS audit coverage of an operational control framework, then the audit should also cover certain EM programs governed by the controls. Accordingly, if the internal EMS audit primarily covers specific operational controls and BP processes, then there may be no need to cover EM programs beyond what is to be covered under the primary coverage components. Essentially, there are primary and secondary scope and coverage components. For example, primary scope could be within a department, while secondary scope could involve personnel in other areas and at different levels within the energy utility.

An EMS in an energy utility should establish a structure that threads management direction and control with employee action in the context of EM. A representative sample for an EMS audit should cover the thread between those responsible for making EM decisions, those responsible for supporting decision making through EPM, those responsible for directing and implementing action, those responsible for supporting action through the development and maintenance of control systems, and those accountable for action performance.

Figure 3.1: Supplier Directory for REIMSAP EMS Audit SCCD Process in an Energy Utility


Primary Communication Link for SCCD Process
Secondary Communication Link for SCCD Process (i.e. Communication as a result of consultation with primary or other communication links)
If audit coverage of emerging environmental management risk ,opportunity or issue, can provide direction on related contact people (e.g. Internal experts, managers responsible for directing response action...etc.)
Information provided based on awareness of EMS and surrounding issues
If audit coverage of business planning and review processes , can provide:
- Direction to high-risk and priority environmental objectives , targets and programs
- Information on the delegation of business plan elements
- Performance information related to the achievement of business plan elements
If audit coverage of specific EMS program, can provide:
- Direction to high-risk or priority EMS programs
- Information on reported performance conditions
- Direction to Program Managers
If audit coverage of environmental regulatory compliance control framework or issues, can provide:
- Direction to areas of high-risk in terms of regulatory compliance
- Information on regulatory issues (i.e. citations received, corrective or preventive actions being undertaken. etc.)
If audit coverage of EMS supporting tools or controls, can provide
- Advisement on criteria against which to audit
- Direction to business areas and personnel responsible for the implementation of such tools and controls
Personnel Responsible for the Development and Maintenance of EMS Supporting Tools or Controls
If audit coverage of EMS supporting tools or controls, can provide
- Direction to personnel responsible for developing and maintaining supporting tools and controls
- Direction to personnel responsible for implementing supporting tools and controls
Corporate EMS and Environmental Performance Coordinator
If audit coverage of emerging environmental management risk, opportunity or issue of concern, can provide
- Advisement and information related to the nature of the issue
- Information on response action and related contacts
Direction to such experts can stem from communications with the Corporate Environmental Performance and EMS Coordinator
Internal Experts on Specific Fields (e.g. Law Department, QHQ Experts etc.)
Business Unit Environmental Performance and EMS Coordinators
Lead Internal EMS Auditor
If auditing scope based within a functional business area with reference to geographic location or not, can provide information on key risks, priority EMS coverage components and other issues of concern to be covered within associated business area
Division or Department Manager considered secondary communication link if direction to business area stems from consultation with Environmental Performance and EMS Coordinators. Division or Department Manager considered primary communication link if direction provided by audit program parameters or if direction is not provided through a primary communication link
If audit coverage of EMS or SMS related program, Division or Department Manager may be accountable for performance of the program The Lead Program Manager can provide advisement on program criteria including performance conditions reported, management controls surrounding program implementation and any risks or issues of concern related to the program
Certain Divisional and Departmental Managers
Occupational Safety and Health Department Manager
If audit coverage of operational, emergency response or regulatory compliance control framework maintained through Occupational Safety and Health Department, can provide
- Input on related performance conditions and regulatory compliance issues (e.g. major spills and incidents)
- Direction to control framework lead personnel
If audit coverage of specific SMS related program, can provide:
- Information on reported performance conditions
- Direction to Program Managers
- Direction to Operational or Emergency Response Control Leads associated with program implementation
Core and Non-Core Operational Control and Emergency Response Lead Responsibilities and Experts
If audit coverage of operational control, emergency response control, or other regulatory compliance control framework, can provide
- Information on criteria against which to assess (i.e. what is expected)
- Information on any related issues of concern or risks (e.g. changing requirements)
- Direction to key areas and personnel applying controls
If audit coverage of EMS or SMS program governed by environmental management controls, can provide information on criteria against which to assess controls imposed on program implementation
Direction to Core and Non-Core Operational Control and Emergency Response Control Lead Personnel may stem from consultation with Program Managers

3.4.3 REIMSAP Model Presentation

Figure 3.2 presents the proposed REIMSAP process model applied to an EMS in an energy utility. This is the major contribution of this research. It presents a process model that integrates result-based information into an internal EMS audit program framework. It is supported by other contributions including the energy utility case specific internal EMS audit categorization scheme (Table 3-1) and the case specific audit SCCD process supplier directory (Figure 3.1).

Table E1 in Appendix E presents a responsibility matrix for the REIMSAP model applied to an EMS in an energy utility. Responsibilities are categorized and described under auditor, audit client, and/or audit program stakeholder roles. Table E2 in Appendix E presents an analysis of inputs and outputs for the REIMSAP model applied to an EMS in an energy utility.

Figure 3.2: REIMSAP Process Model Applied to an EMS in an Energy Utility

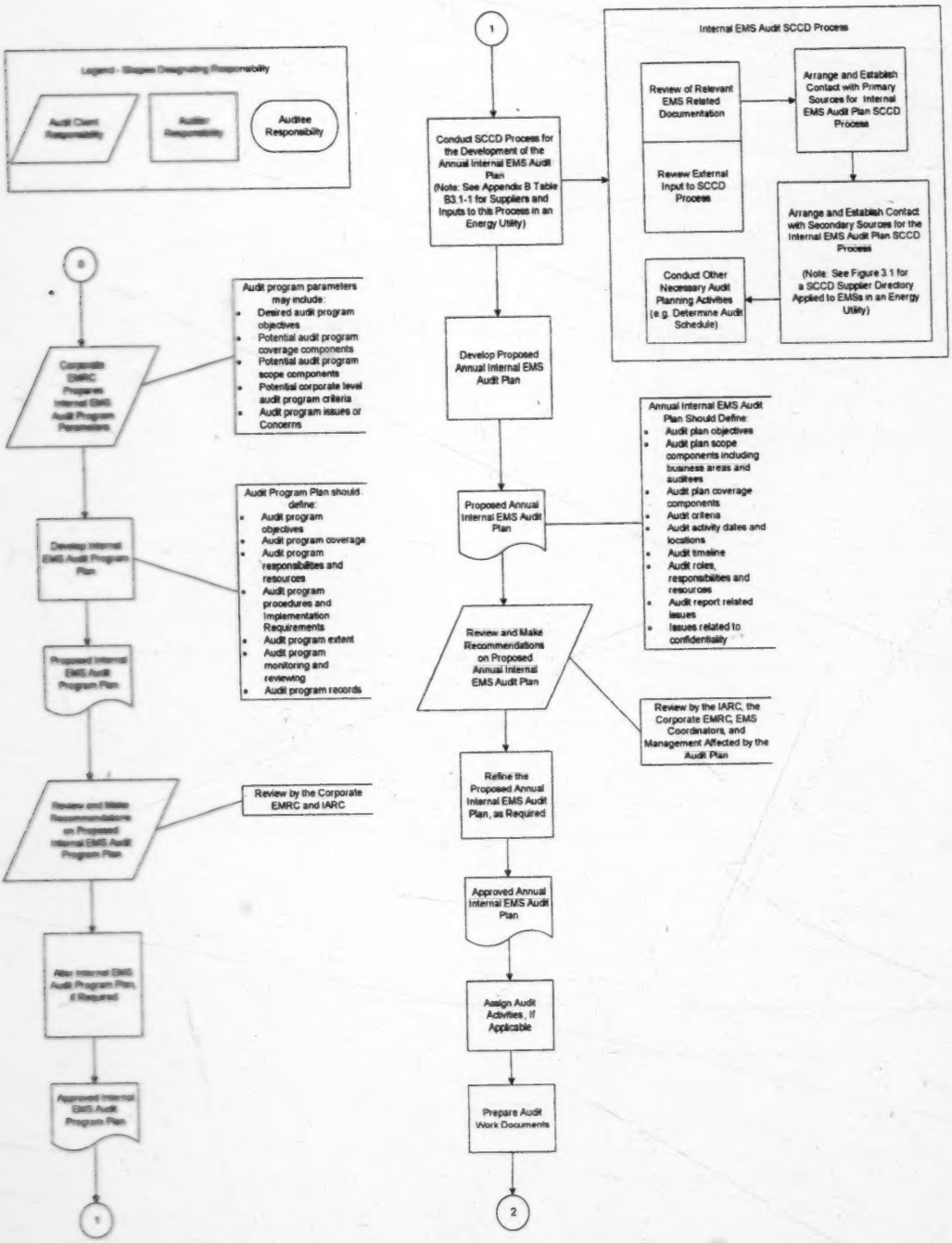

Audit Client Responsibility
Auditor Responsibility
Auditee Responsibility
Conduct SCCD Process for the Development of the Annual Internal EMS Audit Plan
(Note: See Appendix B Table B3.1-1 for Suppliers and Inputs to this Process in an Energy Utility)
Internal EMS Audit SCCD Process
Review of Relevant EMS Related Documentation
Arrange and Establish Contact with Primary Sources for Internal EMS Audit Plan SCCD Process
Review External Input to SCCD Process
Arrange and Establish Contact with Secondary Sources for the Internal EMS Audit Plan SCCD Process
(Note: See Figure 3.1 for a SCCD Supplier Directory Applied to EMSs in an Energy Utility)
Conduct Other Necessary Audit Planning Activities (e.g. Determine Audit Schedule)
Develop Proposed Annual Internal EMS Audit Plan
Annual Internal EMS Audit Plan Should Define:
Audit plan objectives
Audit plan scope components including business areas and auditees
Audit plan coverage components
Audit criteria
Audit activity dates and locations
Audit timeline
Audit roles, responsibilities and resources
Audit report related issues
Issues related to confidentiality
Proposed Annual Internal EMS Audit Plan
Review and Make Recommendations on Proposed Annual Internal EMS Audit Plan
Review by the IARC, the Corporate EMRC, EMS Coordinators, and Management Affected by the Audit Plan
Refine the Proposed Annual Internal EMS Audit Plan, as Required
Approved Annual Internal EMS Audit Plan
Assign Audit Activities, If Applicable
Prepare Audit Work Documents
Audit program parameters may include:
Desired audit program objectives
Potential audit program coverage components
Potential audit program scope components
Potential corporate level audit program criteria
Audit program issues or Concerns
Audit Program Plan should define:
Audit program objectives
Audit program coverage
Audit program responsibilities and resources
Audit program procedures and Implementation Requirements
Audit program extent
Audit program monitoring and reviewing
Audit program records
Review by the Corporate EMRC and IARC

Figure 3.2: Continued

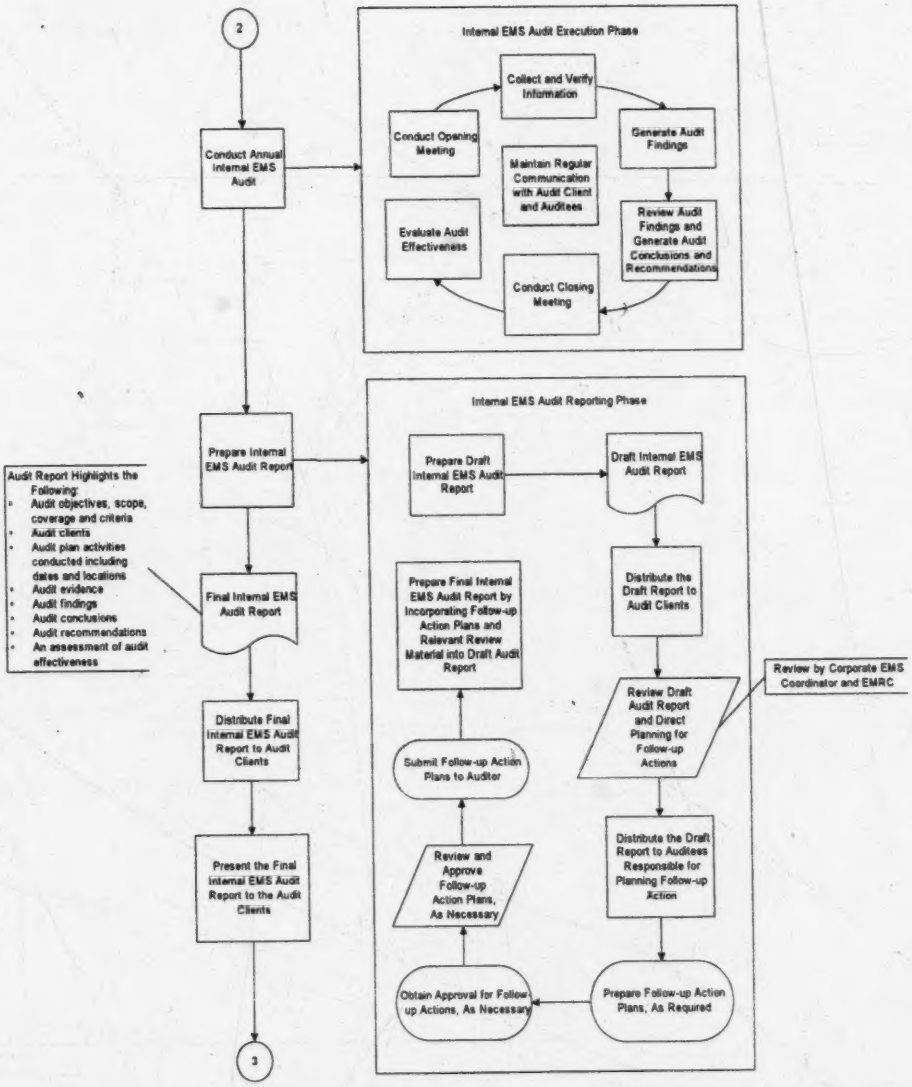
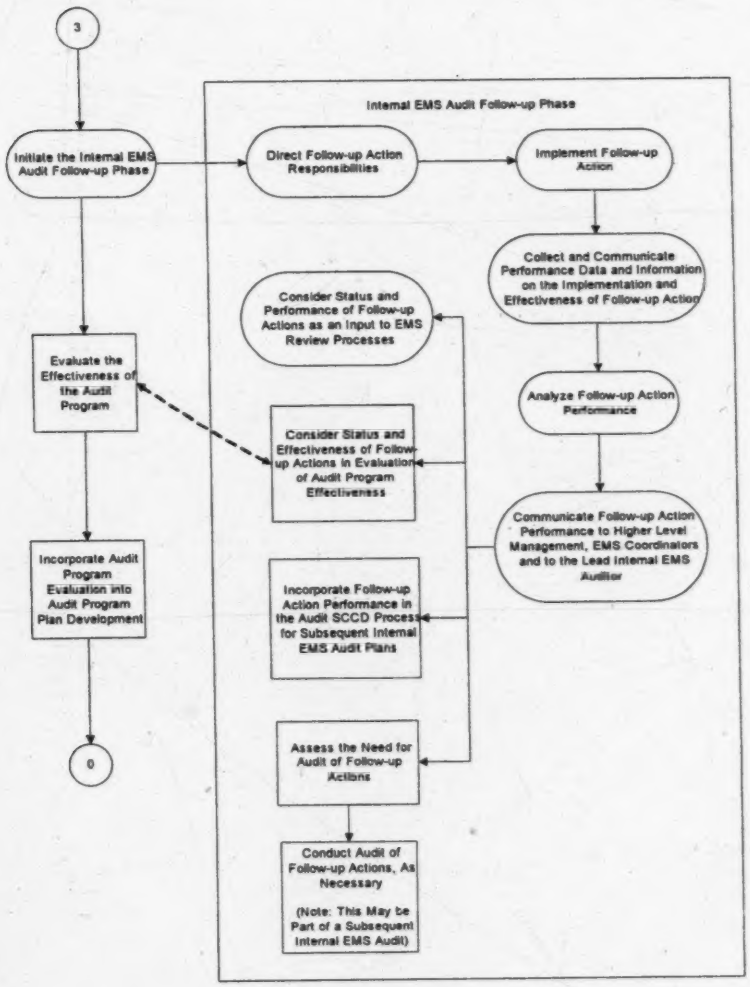

2
Conduct Annual Internal EMS Audit
Internal EMS Audit Execution Phase
Collect and Verify Information
Conduct Opening Meeting
Generate Audit Findings
Maintain Regular Communication with Audit Client and Auditees
Review Audit Findings and Generate Audit Conclusions and Recommendations
Evaluate Audit Effectiveness
Conduct Closing Meeting
Internal EMS Audit Reporting Phase
Prepare Internal EMS Audit Report
Audit Report Highlights the Following:
Audit objectives, scope, coverage and criteria
Audit clients
Audit plan activities conducted including dates and locations
Audit evidence
Audit findings
Audit conclusions
Audit recommendations
An assessment of audit effectiveness
Prepare Draft Internal EMS Audit Report
Draft Internal EMS Audit Report
Final Internal EMS Audit Report
Prepare Final Internal EMS Audit Report by Incorporating Follow-up Action Plans and Relevant Review Material into Draft Audit Report
Distribute the Draft Report to Audit Clients
Review by Corporate EMS Coordinator and EMRC
Review Draft Audit Report and Direct Planning for Follow-up Actions
Distribute Final Internal EMS Audit Report to Audit Clients
Submit Follow-up Action Plans to Auditor
Present the Final Internal EMS Audit Report to the Audit Clients
Review and Approve Follow-up Action Plans, As Necessary
Distribute the Draft Report to Auditees Responsible for Planning Follow-up Action
Obtain Approval for Follow-up Actions, As Necessary
Prepare Follow-up Action Plans, As Required
3

Figure 3.2: Continued


3
Internal EMS Audit Follow-up Phase
Initiate the Internal EMS Audit Follow-up Phase
Direct Follow-up Action Responsibilities
Implement Follow-up Action
Collect and Communicate Performance Data and Information on the Implementation and Effectiveness of Follow-up Action
Consider Status and Performance of Follow-up Actions as an Input to EMS Review Processes
Evaluate the Effectiveness of the Audit Program
Analyze Follow-up Action Performance
Consider Status and Effectiveness of Follow-up Actions in Evaluation of Audit Program Effectiveness
Communicate Follow-up Action Performance to Higher Level Management, EMS Coordinators and to the Lead Internal EMS Auditor
Incorporate Audit Program Evaluation into Audit Program Plan Development
Incorporate Follow-up Action Performance in the Audit SCCD Process for Subsequent Internal EMS Audit Plans
0
Assess the Need for Audit of Follow-up Actions
Conduct Audit of Follow-up Actions, As Necessary
(Note: This May be Part of a Subsequent Internal EMS Audit)

3.5 Summary

This chapter has presented the conceptualization of the REIMSAP model applied to an EMS in an energy utility. The methodology used in conceptualizing the REIMSAP model was discussed. The linkages between result and system-based EPM as a basis for integration were analyzed. The REIMSAP model was then presented. The REIMSAP model was supported by a categorization scheme for potential internal EMS audit scope and coverage elements in an energy utility. It was also supported by a directory of SCCD suppliers needed to incorporate result-based EPM consideration into audit planning.

4.0 Application of REIMSAP to BP, EPR and IMS

4.1 Introduction

This chapter examines the application of the REIMSAP model to BP and EPR in an energy utility. It also examines the application of the REIMSAP model for the integration of internal management systems and supporting system-assessment methodologies. It is hypothesized that the REIMSAP model, including the supporting models for the result-based EPM network, can apply to and facilitate BP, EPR and integration efforts in an energy utility. To prove this theory, the following sub-sections are dedicated to discussing and depicting the following:

- REIMSAP integration with BP including discussion on the linkages between BP and REIMSAP cycles, and a description of the effects of a REIMSAP approach on BP.
- RIEMSAP application to EPR including an examination of REIMSAP relation to EPR and analysis of REIMSAP effects on EPR.
- REIMSAP application for IMS including analysis of REIMSAP applicability to IMS and the Systems Model for IMS, analysis of REIMSAP application for the integration of system-assessment processes, and a description of REIMSAP effects for IMS.

4.2 REIMSAP Application to BP in an Energy Utility

4.2.1 Discussion on BP in an Energy Utility

In an energy utility, there are essentially two categories of planning, namely strategic long-range planning and business planning. For discussion on the distinction between the two, refer to Appendix F Section 1.

Although the case utility has a rigorous BP process in place (see Chapter 5), not all energy utilities will have the same system or structure. With a large fully-integrated energy utility such as the case utility, it is assumed that BP processes are established. BP is broken down into levels including corporate, business unit, division and department. There should be a time lag between planning at different organizational levels so that there is a cascading effect with high level direction driving lower level actions. A typical business plan will have a vision statement, a mission statement, goal statements, a listing of objectives, programs and strategic initiatives, a listing of applicable measures and targets, current state data and information, as applicable, and information on the deployment of objectives, programs and initiatives.

Measurement data and information for corporate and business unit business plans should filter through a PM team that performs compilation, analysis and communication functions. It will flow bottom-up through an established structure. Quarterly business plan reviews are suggested with a monthly dashboard review for certain priority measures and targets. The business plan reviews serve to assess current state data and information to determine progress towards objectives, targets and programs, to develop any necessary corrective or preventive action plans, and to adjust the business plans accordingly.

Table 4-1 presents a SIPOC (Supplier, Input, Process, Output, Customer) analysis of BP processes in an energy utility. Table 4-1 Part B is a continuation of the table that presents only SI, as POC is consistent from Table 4-1 Part A. Table 4-1 is a contribution in that it describes case specific BP processes. It is based on the case utility's existing BP processes and on additional input requirements identified through case utility analysis of REIMSAP application (see Chapter 5).

Table 4-1: Part A: SIPOC Analysis of BP Processes in an Energy Utility

Supplier	Input	Process	Output	Customer
- BP Process	- Higher Level Business Plans (CSP, Business Unit and Division Level, if Applicable) Including Operating Principles, Vision, Mission, Goals, Objectives, Programs, Measures and Targets - Includes Consideration of Environmental Aspects	Annually, Business Area Management, Delegates and BP Facilitator(s) Prepare Inputs, as Applicable, Review Inputs and Prepare a Business Plan for the Pertinent Business Area Quarterly, Business Area Management and Delegates Review Inputs, and, as Necessary, Develop Corrective and Preventive Action Plans and Revise the Pertinent Business Plan Monthly, Business Area Management and Delegates Review Dashboard Measures, and, as Applicable, Develop Corrective or Preventive Action Plans, Revise the Pertinent Business Plans, and Note Issues to be Raised to Higher Level Management or at Quarterly Business Plan Review	Corporate Strategic Plan (CSP) Business Unit Business Plan Divisional Business Plans Departmental Business Plans Corrective and Preventive Action Plans	– Board of Directors – Management at All Levels – Employees For the CSP (Available to the Public): – Customers – Interested Parties – Public Affected by Operations – Government Agencies
- BP Process	- Other Business Area Business Plans, as Applicable			
- Performance Measurement Team	- Current State Performance Data and Information for Defined Targets, Objectives and Actions			
- Business Area Responsible for Conducting Employee Survey	- Employee Survey Results for Business Area			
- BP Process	- SIPOC Analysis of Business Area (Specific to Case Utility)			
- BP Process	- SWOT (Strengths, Weaknesses, Opportunities and Threats) Analysis and Risk Analysis for Business Area (Specific to Case Utility)			
- BP Process	- Analysis of Critical Issues Facing Business Area			
- Business Area Management	- Business Area Risk Profile			
- OS&H Department	- Information on Critical Safety and Health Issues (e.g. Issues Related to Changing Safety Legislation and Controls) - SMS Implementation Information			

Table 4-1: Part B: SIPOC Analysis of BP Processes in an Energy Utility

Supplier	Input
- Benchmarking Representatives	- Information from Benchmarking Initiatives such as the CEA's Committee On Corporate Performance and Productivity Evaluation (COPE) or the Electric Utility Cost Group (EUCG) (Specific to Case Utility)
- Public Affairs Division	- Concerns from Interested Parties
- EMS Coordinators	- Information on Critical EM Issues (e.g. New and Emerging Environmental Issues, Improvements to the EMS's, Changes to Environmental Regulation, Environmental Performance Concerns…etc.)
- Workplace Safety and Health Committees	- SMS Measurement Index
- Business Area Responsible for Coordinating and Administering Self-Assessment Scheme	- Other Self-Assessment Indexes such as the President's Organizational Performance Assessment (POPA) System (Specific to the Case Utility)
- Business Area Management	- Review of Regulatory Compliance and Control within Business Area – May Involve Review of Self-Assessment Reports, Reviews Specific to License Compliance, Review of "Guide to Environmental Legislation"…etc.
- Business Area Management (Department Level)	- Status of Employee Training and Development Initiatives
- Workplace Safety and Health Committees, Business Area Management or Implementation Lead	- Status of Action Plans from Safety Inspections, Incident Investigations, Emergency Control Testing
- IAD and External Auditors	- Audit Reports Including Findings, Recommendations, Conclusions, and Follow-up Action Plans
- Business Area Management or Implementation Lead	- Status of Follow-up Action Plans from Auditing
- Employees	- Employee Ideas and Feedback
- Business Area Responsible for Complaint Trend Analysis	- Complaint Trend Analysis
- Business Area Management or Implementation Lead	- Status of Action Plans from EMS and Business Plan Reviews

4.2.2 REIMSAP Integration with BP Cycle

With BP driving EMS related planning at the business unit, division and department levels, it is suggested that business plan and EMS reviews be integrated at a business unit level. Referring to the plan-do-check-act cycle that forms the foundation of an EMS, BP processes can cover both the planning and checking phases. The BP inputs identified above coincide with those required under ISO/DIS 14001, 2003. There may be

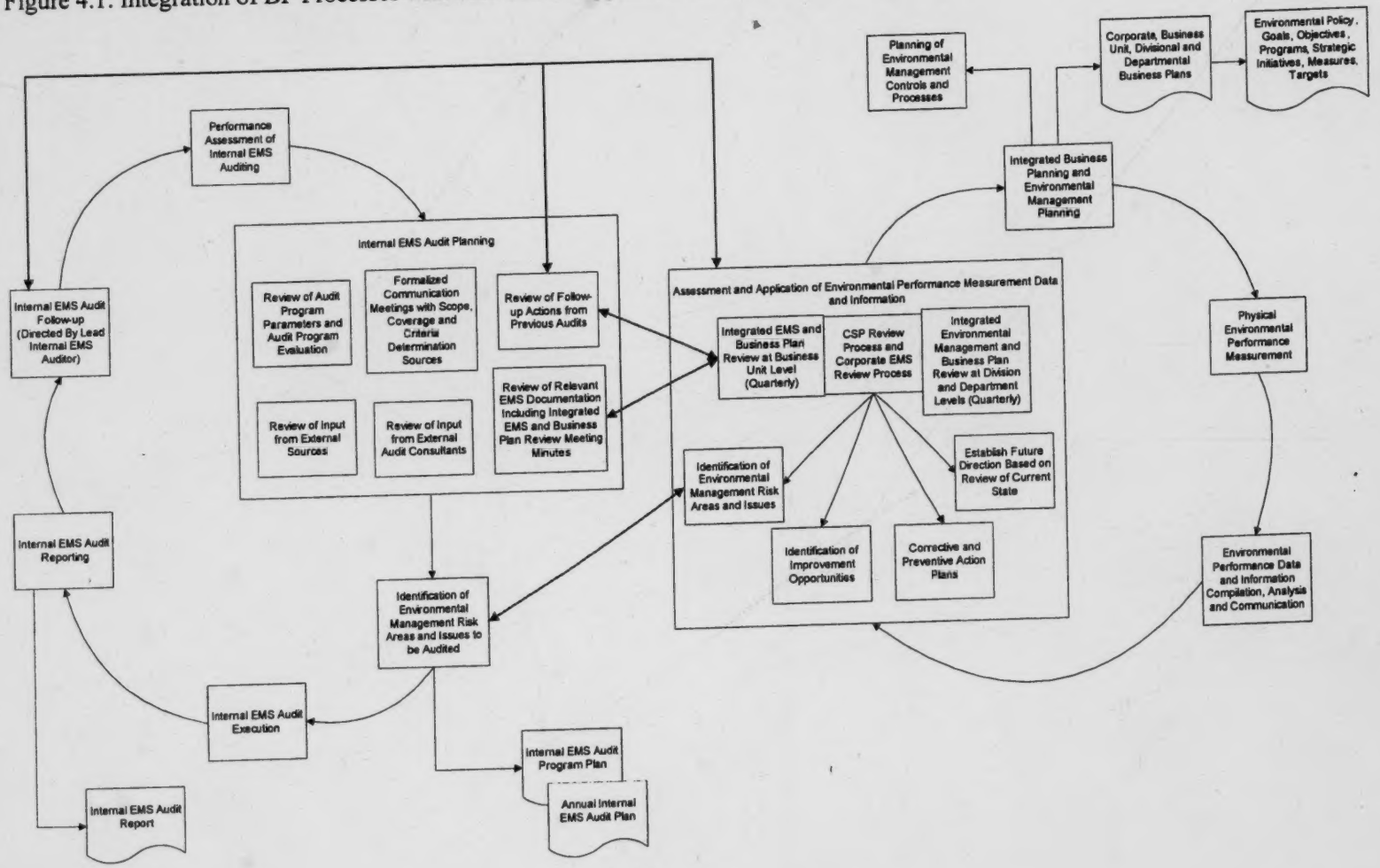
other considerations to evaluate the EMS's continuing suitability, adequacy and effectiveness that are left to interpretation. For example, an EMS review may cover controls, documentation, and communication. ISO 14001 EMS elements that should already be covered through BP are EM policy, environmental aspects, legal and other requirements, objectives and targets, EM programs, training, and parts of checking and corrective action.

The REIMSAP model brings together two cycles. Internal EMS auditing follows a cycle from audit planning to execution, reporting, follow-up, and audit program evaluation. BP follows a cycle from the development of business plans to PM activities to review. With an integrated business plan and EMS review process at the business unit level, measurement activity for control and communication elements can flow through the BP cycle. At division and department levels, there may be no need for a detailed EMS review process; however, there will still be a need to plan and review EMS elements such as programs and controls. This can be accomplished through BP processes.

Figure 4.1 depicts the integration of BP processes with the REIMSAP process model applied to EMSs in an energy utility. Figure 4.1 is a contribution of this research, as it supports the proposed model by depicting the integrative links between REIMSAP and business planning cycles.

What is most important to note about Figure 4.1 is that internal EMS audit planning, EMS reviews, and business plan reviews all serve to identify EM risk areas and issues. Integration between internal EMS auditing and BP is driven by this output.

Figure 4.1: Integration of BP Processes with REIMSAP Applied to an EMS in an Energy Utility


Planning of Environmental Management Controls and Processes
Corporate, Business Unit, Divisional and Departmental Business Plans
Environmental Policy, Goals, Objectives, Programs, Strategic Initiatives, Measures, Targets
Integrated Business Planning and Environmental Management Planning
Performance Assessment of Internal EMS Auditing
Internal EMS Audit Planning
Review of Audit Program Parameters and Audit Program Evaluation
Formalized Communication Meetings with Scope, Coverage and Criteria Determination Sources
Review of Follow-up Actions from Previous Audits
Review of Input from External Sources
Review of Input from External Audit Consultants
Review of Relevant EMS Documentation Including Integrated EMS and Business Plan Review Meeting Minutes
Assessment and Application of Environmental Performance Measurement Data and Information
Integrated EMS and Business Plan Review at Business Unit Level (Quarterly)
CSP Review Process and Corporate EMS Review Process
Integrated Environmental Management and Business Plan Review at Division and Department Levels (Quarterly)
Identification of Environmental Management Risk Areas and Issues
Establish Future Direction Based on Review of Current State
Identification of Improvement Opportunities
Corrective and Preventive Action Plans
Physical Environmental Performance Measurement
Environmental Performance Data and Information Compilation, Analysis and Communication
Internal EMS Audit Follow-up (Directed By Lead Internal EMS Auditor)
Internal EMS Audit Reporting
Identification of Environmental Management Risk Areas and Issues to be Audited
Internal EMS Audit Execution
Internal EMS Audit Program Plan
Annual Internal EMS Audit Plan
Internal EMS Audit Report

4.2.3 REIMSAP Effects on BP Cycle

The application of the REIMSAP model on BP leads to potential advantages and disadvantages related to BP, internal EMS auditing, and EMS review. Table 4-2 highlights these potential benefits and drawbacks. Table 4-2 Part B is a continuation of the table that presents only potential benefits, as the drawbacks are consistent with Table 4-2 Part A. It is concluded that the REIMSAP model can be integrated with and can facilitate BP processes in an energy utility; however, there needs to be an integrated approach to EMS planning and review and business planning and review.

Table 4-2: Part A: Benefits and Drawbacks of REIMSAP application to BP

Benefits of REIMSAP Model to BP, EMS Review and Internal EMS Auditing	**Drawbacks of REIMSAP Model on BP, EMS Review and Internal EMS Auditing**
Can provide for clear and transparent definition of EPM responsibilities and environmental performance accountability Can provide for more efficient and effective flow of performance data and information to the processes	Integrated business unit EMS and business plan review process increases workload at business plan review meetings with additional considerations and input for the environmental goal sections
Provides for result-based measurement consideration in internal EMS audit planning, which provides the Lead Internal EMS Auditor further resources to evaluate environmental risks and plan for auditing Can lead to optimized internal EMS audit scope, coverage and criteria	Integrated business unit EMS and business plan review may dilute the EMS review process (i.e. additional workload may lead to missed considerations and issues)
Development of an internal EMS audit SCCD process can provide for a more transparent risk assessment process for internal EMS audit planning	Does not standardize the BP process or rectify inconsistencies related to management interpretation of and commitment to BP
Can reduce the workload of the Lead Internal EMS Auditor with measurement data and information on audit follow-up action supplied rather than collected	Can increase workload in terms of internal EMS audit execution with additional coverage needs identified through SCCD process
Development of an internal EMS audit SCCD process provides for a collaborative internal EMS audit planning effort (i.e. EPM information provided stems from multiple sources) Provides for the empowerment of employees in that employee input and feedback may factor into internal EMS audit SCCD process	Development of an internal EMS audit SCCD process can lead to additional workload for the Lead Internal EMS Auditor in terms of internal communication in audit planning phase
Integrated business unit level business plan and EMS review can reduce the workload for division managers (i.e. scheduling two meetings vs. one) and duplication effort (i.e. one forum for the setting of corrective/preventive action vs. two)	Requires additional measurement data and information streams to fully integrate EMS planning and measurement with BP

Table 4-2: Part B: Benefits and Drawbacks of REIMSAP application to BP

Benefits of REIMSAP Model on BP, EMS Review and Internal EMS Auditing
Provides for efficient EMS auditing (i.e. one forum for the coverage of integrated business unit level business plan and EMS review process leads to coverage of EMS planning, EMS checking and corrective action, and EMS review)
Audit coverage of BP processes may help to identify inconsistencies in the processes, which can increase credibility in and commitment to BP
Integrated EMS and business plan review process can provide a stronger link between the planning of EMS elements (i.e. eliminates the separation between review of EM controls and review of EM objectives, targets and programs)
Integrated EMS and business plan review process can provide a stronger link between EMS planning and the planning of other management systems and organizational goals (i.e. integrated system planning, checking and review)
Integrated EMS and business plan review process can improve the efficiency of corrective/preventive action planning (i.e. BP teams can delegate and approve action that would otherwise be recommended through a separate EMS review forum)
Development of an SCCD process can provide for stronger credibility in internal EMS audit program (i.e. Lead Internal EMS Auditor making the effort to understand activities and processes being audited)

4.3 REIMSAP Application to EPR in an Energy Utility

4.3.1 Discussion on REIMSAP Application to EPR

As discussed in the literature survey, there are essentially three main reasons for external EPR in an energy utility. There are reporting initiatives to satisfy regulatory, voluntary or other mandatory reporting requirements, to publicize and demonstrate EM due diligence, and to gain information through the sharing of best practices and benchmarking. There may be multiple incentives for certain reporting initiatives.

From an EM perspective, benchmarking studies may be of limited value due to inconsistencies or a lack of comparability in the data being benchmarked. For example, it is meaningless to benchmark GHG emission data against composite data that includes utilities with considerably higher generating capacity or utilities with a significantly different generation network (i.e. 80% thermal generation vs. 10% thermal generation).

As a result, benchmarking of environmental performance data and information requires careful consideration of context and comparability.

EPR in an energy utility requires the judgment of management. External EPR should have some perceived value or market. Furthermore, there needs to be careful consideration of EPR content and format. For example, publicity type EPR will rarely convey accounts of failure or negative data and information.

Due to government and stakeholder expectations, external performance reporting that is mandatory, such as the reporting of regulatory compliance data or the disclosure of financial statements, should be well established in an energy utility. In other words, most energy utilities will have the resources and frameworks in place to prepare and submit these reports according to prescribed schedules. Reporting for licenses or for specific legislation should flow through particular business areas that are accountable for compliance performance or for compliance control. The responsibility for directing the reporting process should be that of defined lead report preparation and submission personnel. The REIMSAP model can lead to the coverage of regulatory EPR. If the internal EMS audit covers regulatory compliance frameworks or issues, then the links between the regulator, report preparation and submission personnel, management or personnel accountable for compliance, and measurement personnel should all be assessed. This could be done by tracking a regulatory citation from the regulator to the manager or employee who receives the citation to those responsible for directing and implementing action on the citation.

Reporting for voluntary initiatives, publicity or information sharing and benchmarking is not necessarily something that should be covered by an EMS audit.

There is no requirement in ISO 14001 for external EPR. These reports should be assessed through other means to ensure that they are meeting their intended purpose and continue to provide value. This could be done through a report specific planning and review meeting.

The proposed EPM network structure applies to external EPR. External reporting follows a cycle comprising report planning, the collection of measurement data and information, the preparation, approval and dissemination of the report, and the review of the report to identify improvement opportunities. This cycle refers to reporting that can be improved and does not necessarily capture reporting that has prescribed format and content. The performance measures and information that are published through external reporting should be aligned with existing measures and initiatives under corporate, business unit or other internal business plans. The flow of data and information to lead report preparation personnel could use the BP cycle and the same personnel responsible for data collection and communication.

Reporting of some information, such as success stories, may require report preparation personnel to consult employees that are not direct suppliers to the BP processes. For example, Division or Department Managers, Program Managers, or individual field level employees may need to be consulted regarding involvement in or knowledge of a particular achievement. The Corporate and Business Unit Environmental Performance and EMS Coordinators could potentially provide insight into what to include in EPR and the contacts needed for report data and information.

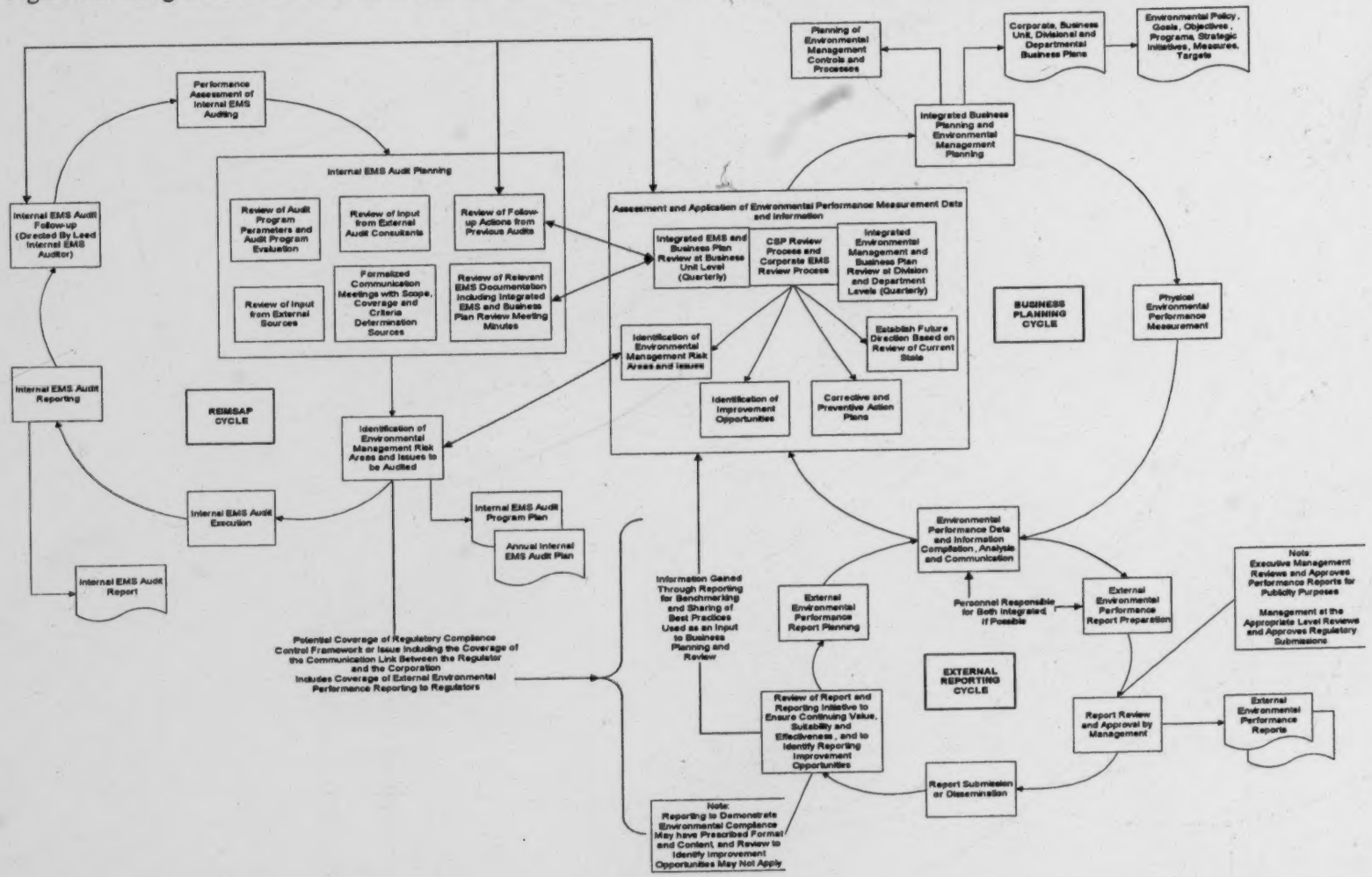
The roles of lead reporting personnel should be planned with consideration given to existing roles, relations and expertise within the energy utility. The preparation of

external reports will typically involve the efforts of several employees with a leader accountable for directing the reporting process. Lead personnel for environmental reporting should be associated with EM or the contents of the report to be prepared. If reporting leads are suppliers to and participants in the BP cycle, there will be an integrative approach to reporting and BP cycles. For example, the role of Corporate Environmental Performance and EMS Coordinator could lead the preparation of the ECR Program Submission based on internal and external affiliations, knowledge of EM activity throughout the utility, and knowledge of the ECR Program.

4.3.2 REIMSAP Integration with BP and EPR Cycles

Based on the above discussion, Figure 4.2 illustrates the integration of the REIMSAP model with BP and external EPR. Figure 4.2 is a contribution of this research, as it supports the proposed model by depicting how integrated REIMSAP and BP cycles apply to external EPR.

Figure 4.2: Integration of External EPR with BP and REIMSAP Cycles Applied to an EMS in an Energy Utility


Planning of Environmental Management Controls and Processes
Corporate, Business Unit, Divisional and Departmental Business Plans
Environmental Policy, Goals, Objectives, Programs, Strategic Initiatives, Measures, Targets
Integrated Business Planning and Environmental Management Planning
Performance Assessment of Internal EMS Auditing
Internal EMS Audit Planning
Review of Audit Program Parameters and Audit Program Evaluation
Review of Input from External Audit Consultants
Review of Follow-up Actions from Previous Audits
Review of Input from External Sources
Formalized Communication Meetings with Scope, Coverage and Criteria Determination Sources
Review of Relevant EMS Documentation including Integrated EMS and Business Plan Review Meeting Minutes
Internal EMS Audit Follow-up (Created By Lead Internal EMS Auditor)
Assessment and Application of Environmental Performance Measurement Data and Information
Integrated EMS and Business Plan Review at Business Unit Level (Quarterly)
CSP Review Process and Corporate EMS Review Process
Integrated Environmental Management and Business Plan Review at Division and Department Levels (Quarterly)
BUSINESS PLANNING CYCLE
Physical Environmental Performance Measurement
Identification of Environmental Management Risk Areas and Issues
Establish Future Direction Based on Review of Current State
Identification of Improvement Opportunities
Corrective and Preventive Action Plans
Internal EMS Audit Reporting
REIMSAP CYCLE
Identification of Environmental Management Risk Areas and Issues to be Audited
Internal EMS Audit Execution
Internal EMS Audit Program Plan
Annual Internal EMS Audit Plan
Internal EMS Audit Report
Environmental Performance Data and Information Compilation, Analysis and Communication
Information Gained Through Reporting for Benchmarking and Sharing of Best Practices Used as an Input to Business Planning and Review
External Environmental Performance Report Planning
Personnel Responsible for Both Integrated if Possible
External Environmental Performance Report Preparation
Note: Executive Management Reviews and Approves Performance Reports for Publicity Purposes
Management at the Appropriate Level Reviews and Approves Regulatory Submissions
Potential Coverage of Regulatory Compliance Control Framework or Issue including the Coverage of the Communication Link Between the Regulator and the Corporation
Includes Coverage of External Environmental Performance Reporting to Regulators
EXTERNAL REPORTING CYCLE
Review of Report and Reporting Initiative to Ensure Continuing Value, Suitability and Effectiveness, and to Identify Reporting Improvement Opportunities
Report Review and Approval by Management
External Environmental Performance Reports
Report Submission or Dissemination
Note: Reporting to Demonstrate Environmental Compliance May have Prescribed Format and Content, and Review to Identify Improvement Opportunities May Not Apply

4.3.3 REIMSAP Effects on EPR

The application of the REIMSAP model and its supporting EPM network structures in an energy utility can affect external EPR in positive and negative ways. The potential benefits and drawbacks of this application are described in Table 4-3 below. It is concluded that the REIMSAP model applies to and can facilitate EPR in an energy utility.

Table 4-3: Benefits and Drawbacks of REIMSAP and Proposed EPM Structure Applications on External EPR

Benefits to External EPR	Drawbacks on External EPR
Can lead to audit coverage of regulatory compliance control frameworks and issues, which can include coverage of regulatory performance reporting and the link between the energy utility and regulators	Increases workload for the Lead Internal EMS Auditor to cover compliance control framework and issues, if this is not already a part of the internal EMS audit program
Integration of the BP structure with the EPR structure can streamline the supply of data and information to external EPR preparation personnel Can eliminate duplication effort in terms of compiling data and information for both BP and EPR processes Can provide for efficient and transparent establishment of EPR suppliers and preparation roles	Increases workload for personnel with EPM data and information compilation, analysis and communication responsibilities (i.e. personnel proactively supplying or preparing information for EPR, in addition to the BP processes)
Provides for the alignment of business plan and EPR measures, which may facilitate the credibility of EPR and BP (i.e. what is being reported accurately reflects the energy utility's priorities and activities)	May require that responsibilities for external EPR preparation be re-evaluated to optimize and integrate EPM collection activity for both BP and EPR

4.4 REIMSAP Application for IMS

4.4.1 Discussion on REIMSAP Application for IMS

Each goal under the case utility's Corporate Strategic Plan (CSP) could be perceived as having a management system. It can be concluded that a fully-integrated energy utility will have management systems related to safety, environment, quality,

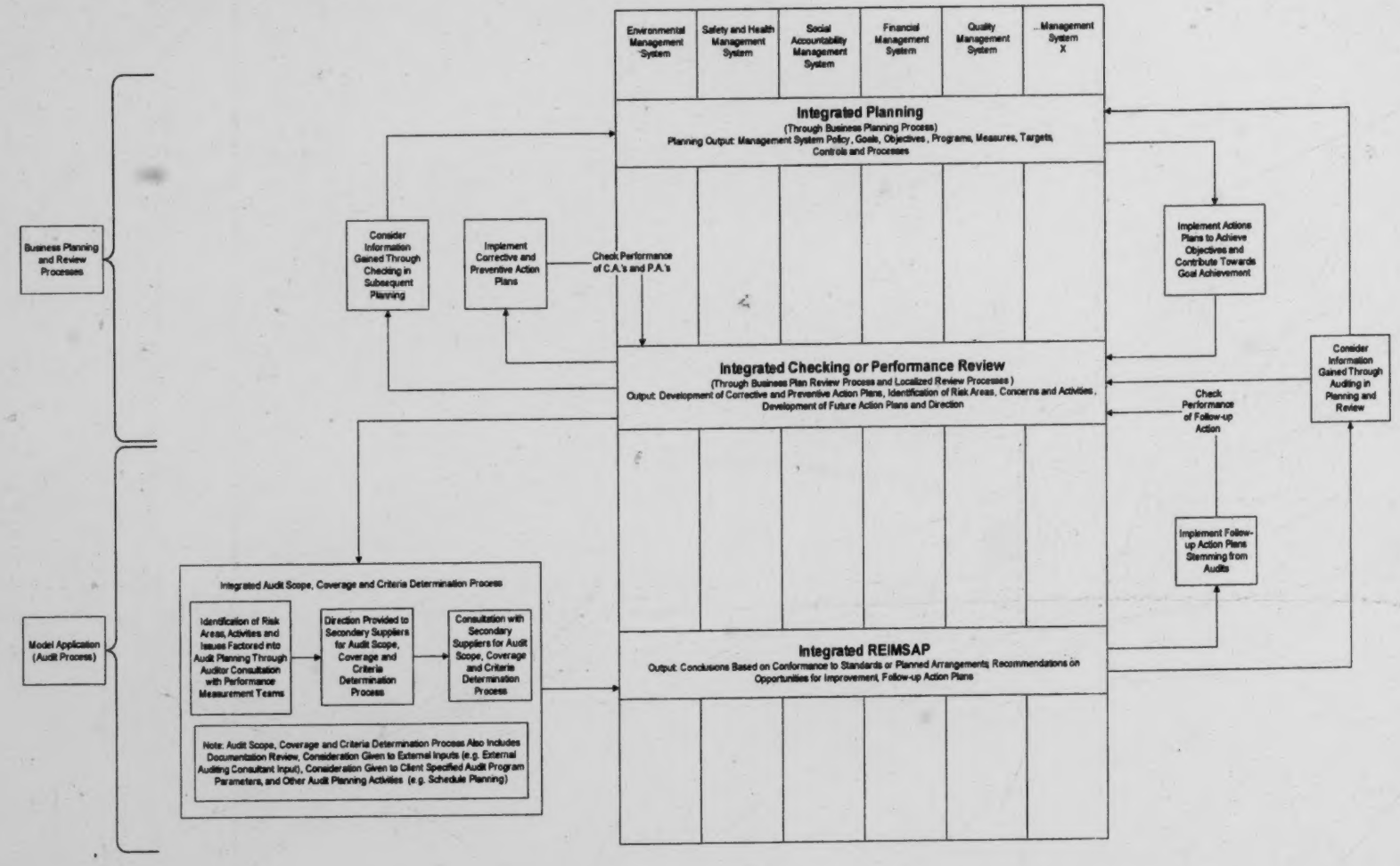
finance, social accountability, recruiting and professional development, corporate citizenship, sustainable development, and energy exporting. For discussion on the management systems applicable to an energy utility, refer to Appendix F Section 2.

Based on the overlapping goals and management systems within an energy utility, there should be an integrative approach to the planning elements of these interdependent systems. Based on previous discussion, BP processes in an energy utility can serve to integrate the planning and the monitoring and measurement elements of various management systems. The REIMSAP model can apply to the development of an IMS through the integration system-assessment processes. A result-enhanced integrated audit program involves, where practical, the integration of result-based PM processes and structure. From Appendix B, the result-based EPM network and process models apply to the development of an IMS in that similar models could be developed for other systems. With an understanding of the flow for PM, common processes and responsibilities can be identified and considered in an integrative approach to internal audit planning.

To apply the REIMSAP model to other management systems and other types of audits, internal auditors must understand the links between management system processes in terms of responsibilities, suppliers, inputs, controls, outputs, and customers. These links should be understood so that the functioning of specific processes can be tracked or covered throughout different organizational levels and across different business areas.

Figure 4.3 illustrates the application of the REIMSAP model on the integration of management systems. The REIMSAP could form a part of an overall IMS. The model applied to an IMS would provide for a result-enhanced integrated audit program that considers PM input as a basis for integrated or joint audit plans.

Figure 4.3: REIMSAP Application for the Integration of Management Systems

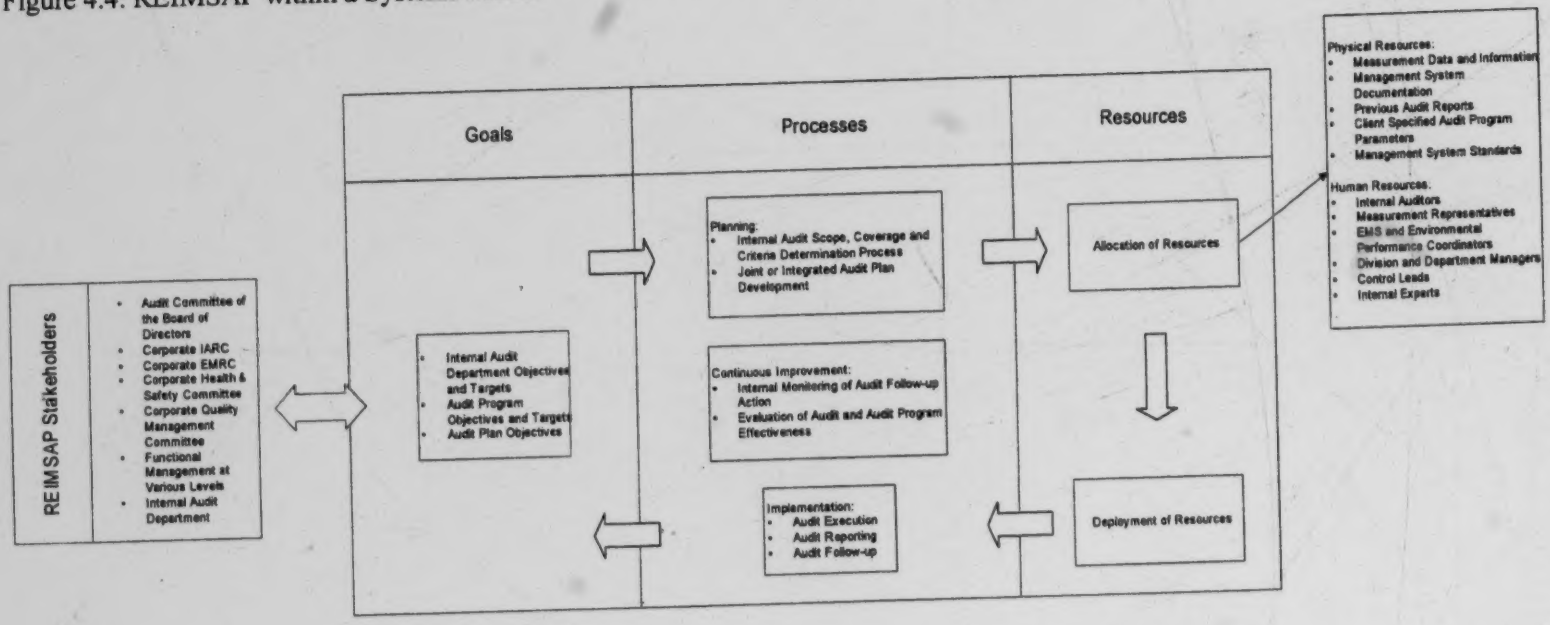

Environmental Management System
Safety and Health Management System
Social Accountability Management System
Financial Management System
Quality Management System
...Management System X
Integrated Planning
(Through Business Planning Process)
Planning Output: Management System Policy, Goals, Objectives, Programs, Measures, Targets, Controls and Processes
Business Planning and Review Processes
Consider Information Gained Through Checking in Subsequent Planning
Implement Corrective and Preventive Action Plans
Check Performance of C.A.'s and P.A.'s
Implement Actions Plans to Achieve Objectives and Contribute Towards Goal Achievement
Integrated Checking or Performance Review
(Through Business Plan Review Process and Localized Review Processes)
Output: Development of Corrective and Preventive Action Plans, Identification of Risk Areas, Concerns and Activities, Development of Future Action Plans and Direction
Consider Information Gained Through Auditing in Planning and Review
Check Performance of Follow-up Action
Implement Follow-up Action Plans Stemming from Audits
Model Application (Audit Process)
Integrated Audit Scope, Coverage and Criteria Determination Process
Identification of Risk Areas, Activities and Issues Factored into Audit Planning Through Auditor Consultation with Performance Measurement Teams
Direction Provided to Secondary Suppliers for Audit Scope, Coverage and Criteria Determination Process
Consultation with Secondary Suppliers for Audit Scope, Coverage and Criteria Determination Process
Note: Audit Scope, Coverage and Criteria Determination Process Also Includes Documentation Review, Consideration Given to External Inputs (e.g. External Auditing Consultant Input), Consideration Given to Client Specified Audit Program Parameters, and Other Audit Planning Activities (e.g. Schedule Planning)
Integrated REIMSAP
Output: Conclusions Based on Conformance to Standards or Planned Arrangements; Recommendations on Opportunities for Improvement, Follow-up Action Plans

4.4.2 REIMSAP Applicability to the Systems Model for IMS

The Systems Model for IMS assumes that a system is a set of inter-linked processes that function harmoniously and share the same resources to achieve set goals (Jonker & Karapetrovic, 2004). Discipline or stakeholder specific management systems, such as an EMS, are essentially modules of the overall IMS adapted to meet particular stakeholder requirements.

The REIMSAP model can be tied to the Systems Model for IMS. Figure 4.4 illustrates REIMSAP within the Systems Model. Referring back to Figure 2.6, the REIMSAP process is linked to the evaluation component of goal management. Therefore, system-assessment processes, such as the REIMSAP model, form a system under the overall IMS. Accordingly, planning could be perceived as an IMS sub-system. Control and improvement could be conceptualized under a systems model, and so forth. The systems model can be perceived as a system comprising a series of interlinking sub-systems. This leads to the conclusion that the REIMSAP model does apply to the integration of internal management systems by providing the framework for an integral IMS sub-system.

Figure 4.4: REIMSAP within a Systems Model



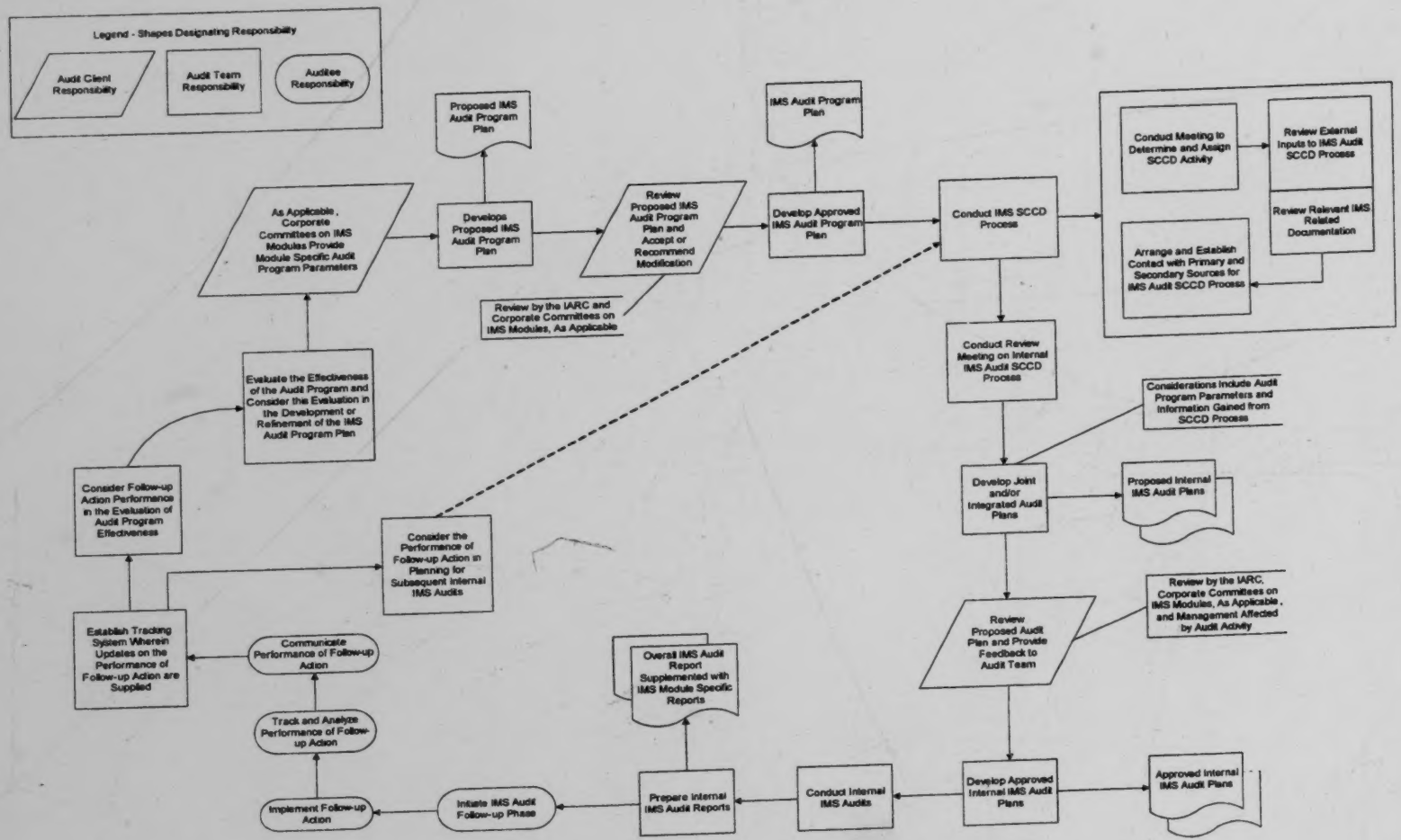
4.4.3 REIMSAP Applicability to Assessment Processes

The REIMSAP model applies to the integration of system-assessment processes through its audit planning requirements. The REIMSAP model could be used to develop joint or integrated audit plans. Essentially, the REIMSAP model applied to an IMS involves an integrated approach to SCCD where PM personnel or suppliers to this process are consulted for all IMS modules (e.g. EMS, QMS, SMS…etc.). Based on this process, joint or integrated audit plans would be developed and executed. To report, the IAD could prepare separate reports for each module or could prepare one overall IMS audit report supplemented by sub-sections that present IMS module specific results.

The performance of IMS audit follow-up actions would then be measured and monitored at the direction of the Manager accountable for said performance. The IAD would have a tracking system wherein it would receive updates on the performance of follow-up action. This would be used as a partial basis for IMS audit program and IMS audit evaluation. Furthermore, this tracking could be used to assess the need to audit follow-up action.

Figure 4.5 illustrates the REIMSAP model applied to an IMS. This is a contribution of this research, as it depicts the generic system-assessment activities within the REIMSAP process that can be tailored to other management systems, including an IMS.

Figure 4.5: REIMSAP Model Applied to an IMS


Legend - Shapes Designating Responsibility
Audit Client Responsibility
Audit Team Responsibility
Auditee Responsibility
Proposed IMS Audit Program Plan
IMS Audit Program Plan
Conduct Meeting to Determine and Assign SCCD Activity
Review External Inputs to IMS Audit SCCD Process
Review Relevant IMS Related Documentation
Arrange and Establish Contact with Primary and Secondary Sources for IMS Audit SCCD Process
As Applicable, Corporate Committees on IMS Modules Provide Module Specific Audit Program Parameters
Develops Proposed IMS Audit Program Plan
Review Proposed IMS Audit Program Plan and Accept or Recommend Modification
Develop Approved IMS Audit Program Plan
Conduct IMS SCCD Process
Review by the IARC and Corporate Committees on IMS Modules, As Applicable
Conduct Review Meeting on Internal IMS Audit SCCD Process
Considerations Include Audit Program Parameters and Information Gained from SCCD Process
Evaluate the Effectiveness of the Audit Program and Consider the Evaluation in the Development or Refinement of the IMS Audit Program Plan
Develop Joint and/or Integrated Audit Plans
Proposed Internal IMS Audit Plans
Consider Follow-up Action Performance in the Evaluation of Audit Program Effectiveness
Consider the Performance of Follow-up Action in Planning for Subsequent Internal IMS Audits
Review by the IARC, Corporate Committees on IMS Modules, As Applicable, and Management Affected by Audit Activity
Review Proposed Audit Plan and Provide Feedback to Audit Team
Establish Tracking System Wherein Updates on the Performance of Follow-up Action are Supplied
Communicate Performance of Follow-up Action
Overall IMS Audit Report Supplemented with IMS Module Specific Reports
Track and Analyze Performance of Follow-up Action
Develop Approved Internal IMS Audit Plans
Approved Internal IMS Audit Plans
Implement Follow-up Action
Initiate IMS Audit Follow-up Phase
Prepare Internal IMS Audit Reports
Conduct Internal IMS Audits

Similar to the Environmental Performance and EMS Coordinators supplying certain BP cycles, there should be Performance Coordinators for other corporate and business unit level goals. For example, there could be performance coordinators related to social accountability goals. Basically, there should be a team of filter personnel for the flow and application of performance information for all types of management systems in an energy utility.

Business plans are a tool that defines accountability. There will be defined business areas and responsibilities established to accomplish corporate and business unit objectives and to implement specific programs and strategic actions. Ideally, the information gained through BP processes should provide partial direction into who auditors should consult prior to developing an audit plan, what should be covered through auditing, what to expect and the criteria against which to audit, and who should be interviewed throughout the audit to accomplish the relevant audit objectives. As a result, it is important for auditors to know how corporate and business unit plans have been deployed.

For planning internal auditing of other management systems in addition to an EMS, there will be a need for internal auditors to consult Department and Division Managers as a basis for determining risk areas, conditions expected and issues of concern. If the REIMSAP model is applied to an IMS, the internal audit team should hold a preliminary meeting to determine consultation needs for IMS audit SCCD. This meeting is necessary because there will be overlapping of personnel to be consulted for information specific to the IMS modules. In other words, a Manager consulted for criteria

information related to an EMS may also be consulted for the same type of information related to a QMS or SMS.

In planning IMS audits, there will be overlap in terms of coverage and scope components for different IMS modules. For example, the business area responsible for an EMS program may be dually responsible for the management of a quality related process. If this business area constitutes a primary IMS audit scope component, then there should be coverage within this business area related to both quality and environmental management. Likewise, coverage of training in a business area may result in findings related to both safety and environmental training.

With an IMS in an energy utility, certain processes will be core to all IMS modules. An example of this would be integrated BP processes. Coverage of this within a business area would lead to partial coverage of each IMS module (i.e. planning and result-based measurement for all IMS modules covered through the same process). To support an IMS audit SCCD process, core processes and elements need to be identified, and accountability needs to be clearly established for IMS module specific objectives, programs, controls, processes, PM and review activities.

Finally, there will be IMS processes and programs that lend themselves to result-based PM, and there will be those that do not. Consequently, there are certain management system processes and elements that can only be adequately checked through auditing. An effective internal management system audit program should cover such processes; however, result-enhancement for such coverage will be based entirely on qualitative information. With this in mind, result-enhancement of an internal audit program depends on strong internal communication, clear responsibility and meaningful

measures. It is concluded that the REIMSAP model applies to the integration of internal management system-assessment methods.

4.4.4 REIMSAP Effects on IMS

In an energy utility, the application of the REIMSAP model as a basis for the integration of system-assessment processes and as a partial basis for the integration of management systems leads to potential benefits and drawbacks. Table 4-4 describes these potential effects.

Table 4-4: Benefits and Drawbacks of REIMSAP Application to the Integration of Management Systems

Benefits on the Integration of Management Systems Based on REIMSAP Application	Drawbacks on the Integration of Management Systems Based on REIMSAP Application
Can provide the framework for an integrated result-enhanced internal IMS audit program	May require significant modification to an energy utility's existing system-assessment processes in order to implement a REIMSAP model applied to an IMS
Can lead to optimized internal audit scope and coverage for the auditing of core IMS and IMS module specific processes and elements Can streamline auditing activity through joint or integrated management system audits	May require significant modification to an energy utility's existing BP system because REIMSAP requires strong measures, a PM network with clear responsibilities, and an integrative approach to management system planning and checking
Development of REIMSAP for an IMS could facilitate the development of an IMS through the identification coverage and scope overlaps (i.e. can help to define management system inter-linkages)	May require re-evaluation and refinement of auditor competencies because joint or integrated auditing involves an audit team comprising auditors qualified to audit EMS, QMS…etc.
Can provide for the integration of audit reporting leading to more effective and efficient audit reports (i.e. multiple audit reports streamlined through supplemented IMS audit report)	Depth of audit coverage may suffer with joint or integrated auditing and detailed coverage of an IMS module may still be required
Can provide for stronger audit results with audit conclusions considering the relation of findings to the overall IMS, as well as to specific IMS modules	
Can be linked with the systems model for IMS, which provides a suitable model for IMS in an energy utility	

It is concluded that the REIMSAP model can facilitate the integration of management systems in an energy utility; however, the need to modify internal audit and BP practices may create situations where the implementation of the REIMSAP model as a partial basis for an IMS is not feasible.

4.5 Summary

This chapter has examined the application of the REIMSAP model to BP, EPR and IMS. BP in an energy utility was discussed, followed by a description and illustration of REIMSAP integration with the BP cycle. The effects of REIMSAP application to BP, EMS review and internal EMS auditing were then presented.

The application of the REIMSAP model and its supporting EPM network models on external EPR were discussed. REIMSAP integration with BP and EPR cycles was illustrated, and the benefits and drawbacks of REIMSAP application to external EPR were described.

Finally, an analysis of REIMSAP applicability to IMS was presented. REIMSAP compatibility with the Systems Model for IMS was discussed and depicted. REIMSAP application to the integration of system-assessment processes was then discussed and supported with a REIMSAP model applied to an IMS. Finally, a description of REIMSAP effects on the integration of management systems in an energy utility was presented.

5.0 Case Utility Analysis of REIMSAP Model Application

5.1 Introduction

This chapter presents a case utility analysis of the application of the REIMSAP model and its supporting material to an energy utility. The case utility analysis involves the following:

- Explanation of case utility analysis methodology
- Description of the case utility and its existing EPM systems.
- The presentation of a gap analysis and discussion on REIMSAP applicability within the case utility.
- Discussion on the validity and issues identified through the gap analysis.

Subsequent sub-sections are dedicated to presenting these topics based on analysis within the case utility.

5.2 Case Utility Analysis Methodology

The case utility analysis presented is based on document review, observation and an interview process. EMS related documentation was reviewed first. Potential interviewees were then identified. Potential interviewees were profiled according to their responsibilities related to EPM, and interview questions were developed. All interviewees had responsibilities related to EM within the case utility. Ethics approval was received for the interview process. Appendix G comprises the application submitted to the University of Alberta Research Ethics Committee, and the associated study approval form received from the Committee. In terms of observation, the work of an EPM Process Improvement Team within the case utility was observed throughout the course of this research.

The description of the case utility's EPM systems is based on the case utility analysis. In studying the existing EPM systems within the case utility, an objective was to identify gaps based on a comparison of the proposed models to case reality. Another objective was to identify inefficiencies within the existing EPM processes. A gap analysis was prepared and supported by recommendations. The gaps identified are based on the case utility analysis. The recommendations for the gap analysis are based on the author's conception of the ideal courses of action to alleviate the gaps.

5.3 Description of Case Utility EPM Systems

5.3.1 Case Utility Background

The case utility is a provincially owned crown corporation operating in a regulated energy market. It is fully-integrated and operates hydroelectric, thermal, and diesel energy generation and transmission facilities. It distributes electricity and natural gas to customers throughout the province and exports electricity to neighbouring provinces and to the United States. Governance of the case utility is carried out by a Board of Directors representing stakeholders and appointed by the Lieutenant Governor in Council. The Board of Directors reports to the Provincial Minister of Finance, who reports to the Provincial Legislative Assembly.

The case utility is divided organizationally into Corporate, Energy Supply, Transmission and Distribution (T&D), Finance and Administration, and Customer Service and Marketing (CS&M) Business Units. The management of the case utility's operations is the responsibility of the company's Executive Management Committee, which comprises the President and Chief Executive Officer (CEO) and Business-Unit

Vice-Presidents (VPs). For expanded discussion on the case utility background, refer to Appendix H Section 1.

5.3.2 Result-Based EPM Processes

The case utility's result-based EPM processes include BP processes, EMS management review processes, EM program specific review processes, a SMS operational and emergency control self-assessment process, measurement processes for emergency prevention and response controls, and measurement processes for EM controls that are outside of the SMS scope. Subsequent sub-sections are devoted to briefly describing these processes. For expanded discussion on the case utility's result-based EPM processes, see Appendix H Section 2.

5.3.2.1 BP Processes

The setting of the case utility's environmental policy, objectives, targets and programs is driven by business planning and business plan review processes. The case utility publishes an annual Corporate Strategic Plan (CSP) that defines the corporate level vision, mission and goal statements. The CSP breaks down each goal into a series of associated strategic objectives, actions, measures and targets. An environmental protection goal section of the CSP is supported by seven corporate level strategic objectives, three measures, and three targets. Two of the corporate environmental measures and associated targets are based on environmental components of public or customer surveys. The other measure and target relates to net GHG emissions.

The CSP is deployed throughout the company through business unit, division and department level BP. Business plan reviews are conducted quarterly at all levels of the case utility. Business plan reviews provide a forum for the assessment and application of EPM information. As part of the reviews, the state of environmental objectives, actions, programs, measures and targets are reviewed. The business plan review processes may lead to the development of corrective or preventive actions to address non-conformances with planned EM arrangements. Data and information for corporate and business unit business plan reviews stem from PM teams comprising EPCs.

5.3.2.2 EMS Management Review Process

EMS management reviews are conducted quarterly at the corporate and business unit levels within the case utility. There is a Corporate Environmental Management Review Committee (EMRC) responsible for conducting the corporate level EMS review. The Corporate EMS Coordinator is the secretary for the Corporate EMRC. At the business unit level, there is one EMS Review Committee for the Energy Supply Business Unit and one EMS Review Committee for both T&D and CS&M business units.

The EMS review processes serve to ensure the continuing suitability, adequacy and effectiveness of the EMSs with consideration given to, but not limited to, emerging issues and changing conditions, EMS related processes, policies and principles, audit recommendations, and performance related to environmental objectives, targets, programs, regulatory compliance and audit follow-up action. The corporate EMS review process has been established more as an EM advisory function to the Executive

Management Committee than a detailed review function. The business unit EMS review information feeds into the corporate level EMS review.

5.3.2.3 Program Specific Review Processes

Within the case utility, at departmental and divisional levels, there may also be review processes that are specific to an EMS program. These reviews serve to assess and apply program specific EPM data and information and to resolve any issues or concerns surrounding the program. Corrective and preventive actions may result from such reviews and information gained will be raised to higher organizational levels, as necessary.

5.3.2.4 SMS Core Control Self-Assessment Scheme

Within the case utility, measurement related to regulatory compliance takes on different forms. There are corporate wide or core operational controls and emergency protocols that are partially built around environmental regulation and corporate policies. They include the Hazardous Materials Management Handout, Corporate Fire Manual, Code of Practice for Compliance with the Workplace Hazardous Materials Information System (WHMIS), Code of Practice for the Storage of PCB's, Code of Practice for Workers Working with or around Asbestos or Man-made Mineral Fibre, Guidelines for Mold Remediation projects, and Code of Practice for Petroleum Product Storage Tank Systems. With the exception of the Code of Practice for Petroleum Product Storage Tank Systems, the above listed control documentation is maintained through the case utility's OS&H Department. The implementation of core operational and emergency controls is a Department Manager responsibility.

The case utility's OS&H Department has developed an implementation guide and self-assessment scheme for the operational controls and emergency protocols that it maintains. This guide and self-assessment scheme is known as the SMS Manual. There are seven environment related components in the SMS Manual including safety and health training and awareness, workplace safety and health inspections, WHMIS (Workplace Hazardous Materials Information System), asbestos containing material and man made mineral fibre, transportation of dangerous goods, hazardous waste, and releases.

Each SMS module presents a series of requirements, performance measures, and supporting notes. Workplace Safety and Health (WS&H) Committees have been established throughout the case utility to plan, schedule and organize SMS activities, to conduct safety meetings, to measure, track and communicate safety and health performance, to ensure that workplace safety inspections are conducted, and to resolve, recommend or take action on safety and health issues. The WS&H Committees are required to report on a quarterly basis, as applicable, the measures defined in the SMS Manual.

5.3.2.5 Measurement for Emergency Prevention

Control requirements related to fire prevention and response are not covered in the SMS Manual in an attempt not to dilute their importance or application. At a facility level, individual facilities have emergency and spill response plans that are maintained by the Department Manager. The Corporate Fire Marshall maintains the Corporate Fire Manual.

At the implementation level, compliance with fire prevention and response controls and regulation is inspected periodically by technically qualified personnel within the OS&H Department or by delegates of the department such as Field Safety Officers. Also, investigations may be performed following spills or accidents in order to assess the need for further corrective or preventive action beyond immediate response actions such as containment.

5.3.2.6 Measurement for Non-Core EM Controls

As an example of non-core EM controls, under the Energy Supply EMS, there are controls related to the design, construction, operation, maintenance, and decommissioning of Energy Supply related facilities and projects. Non-core EM controls are maintained by specific business areas at the direction of the Department or Division Manager. The business area responsible for leading the development of an EM control is typically the one responsible for maintaining the control based on changing circumstances, compliance performance and control effectiveness. There may be situations where the Department Managers responsible for directing the implementation of a specific control is dually responsible for acting on compliance performance. This depends on how accountability has been established for control outcome, implementation and maintenance.

5.3.3 System-Based EPM Processes

The case utility's internal EMS auditing function is the responsibility of a corporate level IAD. Within the IAD, there is one certified internal auditor charged with managing and leading the implementation of the case utility's internal EMS audit program. To describe the system-based EPM processes related to EM within the case utility, it is important to examine other auditing functions of the IAD that overlap with internal EMS auditing. The IAD performs financial audits, comprehensive audits, EMS audits, information technology related reviews, and special investigations and project related consulting services. Comprehensive audits and information technology reviews overlap with internal EMS auditing. The following sub-sections will briefly describe the case utility's comprehensive audits, internal EMS audits and information technology reviews. For expanded discussion on the comprehensive and EMS auditing functions, see Appendix H Section 3.

5.3.3.1 Comprehensive Auditing

Comprehensive audits are scoped within individual departments. Their purpose is to assess the effectiveness, efficiency and economy of departmental resource use. Resources include people, equipment, tools and money. Comprehensive audits provide a systematic review of management control systems for selected operations and functions. As part of the scope determination process for comprehensive audits, IAD considers the asset management, computer resource management, customer service operations, facility or equipment design, construction, maintenance and operation, financial disbursements and receipts, human resource management, planning and budget management, materials

management, safety performance management, land and water use management, and EM. Therefore, as part of the comprehensive audit program, there is an EM audit component.

Because the comprehensive audits are scoped within a single department, only parts of a full internal EMS audit plan can be accomplished through this function. Comprehensive audits do not assess the EMS thread between corporate management down to individual staff.

5.3.3.2 Internal EMS Auditing

The case utility's annual internal EMS audit plan for 2003-2004 can be broken down into three parts. First, there is to be a review of the case utility's EMSs to ensure continuous improvement in documentation and procedures for conformance to the EMS standards. It is intended to verify understanding of the impact of EMS requirements on the execution of daily work activities at various organizational levels. This review is focused on the implementation and operation of the EMS, checking and corrective action and EMS management reviews.

The second part of the EMS audit plan involves the review of findings and follow-up action stemming from previous audits. The previous audits to be considered include the internal EMS audits from 2002 and surveillance audits that were conducted by the company's Registrar following ISO 14001 registration.

The third part of the EMS audit plan involves a review of specific EM programs. For the 2003-2004 annual EMS audit plan, two programs are to be reviewed. They include the case utility's spill and release prevention program and its PCB management program.

5.3.3.3 Information Technology Reviews

As part of the overall internal audit plan for 2003-2004, the IAD intends to review the case utility's Safety Net information system. Safety Net is a database system for recording, communicating and tracking the SMS self-assessment measures. As part of this review, a representative sample of WS&H Committee members are to be interviewed. Also, users of the information within the OS&H Department are to be interviewed. In essence, this review will cover an EMS supporting tool.

5.4 REIMSAP Applicability to the Case Utility

To assess the applicability of the REIMSAP model and its supporting models for the result-based EPM network in an energy utility, a gap analysis has been prepared. This gap analysis is presented in Table 5-1 below. Table 5-1 Part A presents gaps related to result-based EPM and Table 5-1 Part B presents gaps related to system-based EPM. Gaps have been prioritized under these categories with the most significant gaps appearing at the top of the lists. Table 5-1 is a practical contribution of this research in that it presents analysis conducted for the purposes of identifying deficiencies and improvement opportunities based on existing energy utility's EPM practices, as well as their relation to the proposed models. The following sub-sections are dedicated to describing REIMSAP applicability to BP, existing audit functions, EPR and IMS, with reference to the pertinent gaps identified.

Discussion on the relations between case utility reality and the proposed result-based EPM network models presented in Figures B2 to B5 is included in Appendix H Section 4.

Table 5-1 Part A: Gap Analysis between the Case Utility's EPM Systems and the Proposed Models

Gaps Related to Result-Based EPM	***Recommendation***
There is a lack of meaningful environmental performance indicators at the corporate level	– Expand the environmental measures for the CSP to include measures related to regulatory compliance, PCB's, spills and releases…etc. – Align environmental measures in the CSP with measures used for external EPR
There is a lack of leading environmental performance indicators in the business plans	– Factor the SMS measurement index into BP to provide leading indication of compliance performance (i.e. SMS requirements partly based on legislation) and to provide leading indication of the implementation of core EM control – Develop leading indicators related to EM programs (e.g. program requirements achieved on schedule) – Develop self-assessment schemes for environmental licenses and for non-core operational controls
The position of Environmental Performance Coordinator is not integrated with that of EMS Coordinator at the business unit level	– Re-align these positions to eliminate potential duplication effort in terms of EMS awareness (e.g. awareness of environmental objectives, targets, programs and strategic actions) and in terms of the collection and supply of EPM information for both BP and EMS review processes
The EMS management review process at the business unit level is not completely integrated with BP processes	– Integrate these processes at the business unit level through the BP framework – Adopt an expanded agenda for the environmental section of business planning and review that covers EM processes and controls, as well as EM objectives, targets and programs
The SMS measurement framework is not integrated with BP	– Use the SMS index as an input to BP processes – Establish a communication link between Division Managers and Workplace Safety and Health Committees
There is a lack of consistency in terms of management commitment to BP (i.e. business plans vary in terms of content and format and certain departments do not have a business plan)	– Continue to develop and improve the BP processes, as these processes are still in a maturing stage – Continue to facilitate the understanding and implementation of BP processes by providing awareness and training sessions to managers at all levels, by refining and improving the inputs and considerations to the processes, and by improving the flow of data and information to the processes – Undertake an internal audit of the BP processes throughout the company to identify deficiencies in terms of consistency and commitment

Table 5-1 Part A: Continued

There is no corporate-wide procedure for periodically evaluating compliance with relevant environmental legislation and regulations	– Continue to implement the SMS measurement framework, which is a tool to evaluate compliance with certain environmental regulations that have been factored into core operational and emergency controls – Continue to evaluate compliance through localized forums and adopt business plan measures related to compliance performance – Develop a self-assessment scheme for non-core EM controls, where practical (Note: this could provide a basis for compliance evaluation on the regulations and restrictions factored into such controls) – Undertake internal auditing that drills down to assess compliance related controls and issues (Note: this could preclude the need for compliance auditing and provide assurance that there are processes in place to evaluate and act on compliance performance)
There is no corporate-wide procedure for following-up on spills and releases	– Establish a Spills and Releases Officer position within the OS&H Department to perform corporate level analysis of spills and releases
There is no self-assessment scheme for non-core business unit specific EM controls	– Develop a self-assessment scheme for non-core operational controls where practical – Undertake internal audits covering the maintenance and implementation of non-core operational controls
There is no self-assessment scheme for emergency response plans and fire related emergency response control	– Develop a module for emergency preparedness and response to be included in the SMS measurement framework – Undertake an internal audit covering emergency prevention and response controls
There is no corporate-wide self-assessment scheme for environmental licenses, permits, authorizations and approvals	– Self-assess compliance with environmental licensing through the SMS measurement framework or develop a separate self-assessment scheme for environmental licenses – Undertake an audit covering environmental compliance control related to environmental licensing
WS&H Committees can be cross-functional and this structure may not be effective for integrating the SMS process with BP processes	– Develop a new WS&H Committee structure to eliminate cross-functionality where necessary – Establish departmental or divisional WS&H Committees so that there is a link between core control measurement and the functional business area's implementing the controls
WS&H Committees have no reporting or communication link with Division Managers	– Direct WS&H Committees to maintain communication with Division Managers so that the SMS measurement information can be integrated with divisional BP processes
WS&H Committee members are elected and may lack the necessary competency to accurately record SMS measurement data and to develop appropriate action plans	– Select WS&H Committee members based on expertise related to SMS modules – Undertake auditing covering the SMS measurement framework (Note: this might identify deficiencies related reporting accuracy and competency)

Table 5-1 Part A: Continued

There are no apparent consequences if Workplace Safety and Health Committees are not reporting completely or accurately	– Undertake auditing covering the whole of the SMS system, including the implementation, maintenance and measurement of core EM controls under the SMS framework (Note: this could lead to findings against certain WS&H Committees and could instill a higher level of commitment to complete and accurate reporting)
The SMS Manual does not refer to relevant Operational and Emergency Control Lead Personnel	– Revise the SMS Manual to include relevant experts throughout the case utility who are charged with the maintenance of controls, the advising of managers and staff on control requirements, and the collection of performance data and information on control performance
The case utility's risk management program is not linked to the EMSs or to the BP processes	– Expand the corporate risk management program to cover EMS related risks and lower organizational levels – Use risk profiles as an input to BP processes
The case utility's "Guide to Environmental Legislation" is not linked to EM controls	– Refine the "Guide to Environmental Legislation" to make reference to operational and emergency controls that guide compliance with the relevant legislations – Refine the "Guide to Environmental Legislation" to make reference to the Operational and/or Emergency Control Leads responsible for the maintenance of related controls
The SMS measurement framework may have some inefficiencies in terms of data collection	– Coordinate and harmonize the timing of measurement data collection to minimize inefficiencies, but note that reliance on other measurement systems may be inevitable
The SMS measurement framework indexing can hide certain issues and requirement scores can skew the index	– Refine the SMS index - measures that have different reporting timeframes and that can skew the index should only factor into the indexing when data is accurately available – Develop an SMS monthly index and an SMS annual index

Table 5-1 Part B: Gap Analysis between the Case Utility's EPM Systems and the Proposed Models

Gaps Related to System-Based EPM	***Recommendation***
There is no transparent procedure or schedule defined for risk assessment related to internal EMS audits (i.e. SCCD process is not well defined)	– Develop a clear schedule and procedure for the SCCD process that is undertaken in the planning phase of internal EMS audits – Refer to primary SCCD sources to be consulted in this process – Establish formal consultation or communication forums between the Lead Internal EMS Auditor and the internal EMS audit SCCD sources

Table 5-1 Part B: Continued

There has been no systematic review or audit of BP throughout the case utility	– Undertake an extensive internal audit of BP since it is a focal point for the integration of internal management systems – Link auditing of BP with the internal EMS auditing function since BP is a driver for EMS related planning and the development of corrective/preventive action
There has been no internal EMS audit coverage specific to operational, emergency or regulatory compliance controls that follows the thread from implementation up to maintenance levels	– Integrate the comprehensive audit of the OS&H Department with internal EMS auditing to cover both control maintenance and implementation - the current comprehensive audit plan covers the OS&H Department including its functions related to the maintenance of controls and the SMS Manual – Continue to undertake EMS audits that cover operational and emergency related controls (Note: the current internal EMS audit plan will cover the case utility's program for spill and release prevention, which is essentially an audit of controls related to spills and releases) – Undertake auditing covering the whole of the SMS system, including coverage of Safety Net and the SMS measurement system, and coverage of the maintenance and implementation of core controls under the SMS framework – Undertake EMS audits covering non-core EM controls
The Corporate EMRC does not provide input into the planning of comprehensive audits	– Adopt the Corporate EMRC as a client for comprehensive audits – Provide for the consideration of Corporate EMRC parameters in the planning of the EM component of comprehensive audits – Integrate the EM component of the comprehensive auditing function with internal EMS audits (i.e. Use coverage and findings from comprehensive audits in the planning and reporting of internal EMS audits or abandon EM component of comprehensive auditing) – Expand the scope of the EM component of comprehensive audits so that the necessary coverage for an internal EMS audit can be achieved (Note: this could eliminate scattering of EMS coverage)
There is a greater priority in terms of resource allocation on performing comprehensive audits over internal EMS audits	– Integrate the EM component of the comprehensive auditing function with internal EMS audits (i.e. Abandon EM component of comprehensive auditing or use it in EMS auditing) – Expand the scope of the EM component of comprehensive audits so that the necessary coverage for an internal EMS audit can be achieved – Delegate or abandon the Lead Internal EMS Auditor's responsibilities related to comprehensive auditing and dedicate further resources to the internal EMS audit program

5.4.1 REIMSAP Applicability to Case Utility BP Cycle

The case utility has the BP framework in place to support the application of the REIMSAP model; however, the measures are deficient. The application of the REIMSAP model to the case utility depends greatly on the value of result-based EPM. The model requires EPM that serves to identify environmental risk. Ideally, there should be a link between measures at the corporate level down to a department level. In other words, it should be possible to break down corporate measurement data into department, division and business unit impacts or contributions. This is only possible with the GHG emissions measure at the corporate level. The proposed model can only be as effective as the indicators and information that feed the EMS audit SCCD process. At the corporate level, there is a lack of meaningful environmental performance measures and targets in the sense that there are only three, the perception measurement index type indicators have limited value, and there are no leading indicators of performance. There is a lack of leading environmental performance indicators within the case utility, as none were identified in the business plans reviewed. As a result, risk identification and quantification may become reactive.

The business plans throughout the company vary in terms of format and content. There is some inconsistency in terms of management commitment to BP, as some business plans are more comprehensive than others and as certain departments do not have an associated business plan.

In terms of the BP processes, there are still separate business plan and EMS review forums for certain business units. With an integrated business unit business plan and EMS review process, certain EPM data streams do not factor into BP. Specifically,

that for control measurement (e.g. SMS index not considered in BP). There are other inefficiencies that have been noted based on the SMS measurement system. These inefficiencies are described in Appendix H Section 5.

There is no structured corporate-wide procedure for following-up on spills and releases. There is no corporate-wide self-assessment scheme for the case utility's fire prevention and response control processes. Furthermore, the case utility does not have corporate or business unit-wide systematic self-assessment process for non-core or business unit specific EM controls. There are localized forums to review and assess control and/or compliance performance. Feedback on the effectiveness and use of non-core operational controls does not necessarily flow in a systematic manner through the case utility. Rather, it is reactive or relies on informal communication between those responsible for maintaining the controls and those responsible for directing their implementation. The case utility's "Guide to Environmental Legislation" is a tool facilitating the planning of compliance control; however, there is no link in the Guide between the legislation identified and the controls that govern compliance.

There is separation between environmental performance and the EMSs in that, at a business unit level, there are separate EMS Coordinator and EPC roles. Currently, the T&D EPC is a Division Manager who compiles updates on division level environmental objectives, targets and programs through the EMS review process. The information gained through the EMS review process becomes input into the separate business unit business plan reviews. With an integrated business unit EMS and business plan review process, Business Unit EPCs can no longer use a separate EMS review forum to collect

data, information and updates for the business plan review process. As a result, they will need to establish contact with Division Managers through other communication means.

Lastly, the case utility is in the midst of developing a corporate risk management program. As part of the program, corporate risk categories and profiles were developed. Under the environmental risk category, there are sections related to water supply and drought, climate change, and operational impact and infrastructure. The risk management program is aimed at guiding consistent high-level risk assessment across the case utility. At present, it is not integrated with the case utility's EMSs or with BP. As part of the proposed SCCD process, environmental risk profiles have been listed as an input. These profiles do not exist for business units, divisions and departments within the case utility; however, if developed, risk profiles could be a valuable tool facilitating BP and management awareness of risks and risk controls.

These issues should be addressed so that the proposed structures and processes for result-based EPM and the REIMSAP model can be effectively applied within the case utility. It can be concluded that the REIMSAP model can be integrated with and can facilitate BP processes within the case utility. Nevertheless, there will be a need to expand BP agendas, as well as a need to refine or adopt new environmental performance measures to induce a proactive approach to the identification of EM risk issues.

5.4.2 REIMSAP Applicability to Case Utility Audit Functions

The use of result-based EPM in the planning of EMS audits does not apply to all EMS processes or the entire system. It is important to recognize that not everything lends itself to measurement or self-assessment. As a result, systematic checking through

auditing may be the only feasible form of review to provide adequate assurance to management that parts of the system are working.

The case utility's audit plans for 2003-2004 have certain similarities to the proposed coverage components; however, EMS coverage is scattered within different types of audits. The Lead Internal EMS Auditor does conduct some form of risk assessment as part of the audit planning and coordination responsibilities; however, there is no defined process or schedule for EMS audit SCCD or risk assessment. EMS audit SCCD activities are ongoing and at the discretion of the Lead Internal EMS Auditor. This may lead to a lack of transparency in terms of what the IAD does to determine the appropriate scope, coverage and criteria for EMS auditing.

Despite partial alignment between the case utility's current audit plans and the REIMSAP coverage categorization scheme, certain proposed coverage components are not being assessed. There has not been a full audit of the BP process throughout the case utility, nor has there been an audit specific to EM controls covering both implementation and maintenance levels. The review of Safety Net through the IAD's information technology review function should be linked to EMS or comprehensive audits. The reason for this is that the Safety Net functions are part of an overall control framework. This review is not necessarily focused on the implementation of operational and emergency controls that the SMS Manual guides. There should be an integrative approach to the review of Safety Net and auditing that covers the implementation and maintenance of core EM controls.

The pre-registration internal EMS audits for the business units had a strong focus on awareness of EMS elements and on EMS documentation. The focus on verifying

awareness of EMS impact may lack value at an employee or field level. The EMS is a management tool and, at an employee level, focus on awareness should be put into context. It is important for employees to be aware of controls and certain EMS requirements imposed on their responsibilities. It is not necessarily important for individual employees to have awareness on the specifics of an EMS.

Through the initial registration audit, the case utility was issued a minor non-conformance related to evaluating compliance with relevant environmental legislation and regulations. The IAD does not perform compliance auditing. The proposed model coverage components could address the need to evaluate compliance through the assessment of compliance controls and/or issues. With the comprehensive audits, compliance can be evaluated to a degree, but the departmental level only makes up one part of the chain. The EM component of the comprehensive auditing function could be abandoned and covered through EMS auditing. Likewise, the scope of the comprehensive audits could be expanded to provide more complete coverage at all organizational levels. Based on the Lead Internal EMS Auditor's resource allocation, there seems to be more priority on comprehensive auditing over EMS auditing.

5.4.3 REIMSAP Applicability to Case Utility EPR Activity

For discussion on the case utility's EPR practices, refer to Appendix H Section 6. There are certain gaps between the alignment of internal environmental performance measures and the external measures that are reported. For example, the ECR Program definition for priority spills does not coincide with the case utility's definitions for spills. The case utility tracks reportable and non-reportable spill, which are defined according to

legislation in the Province of operation. Each Province or jurisdiction may have different definitions. The ECR Program definition was developed to provide an available and comparable spill measure for Canadian utilities across the board. To prepare the ECR Program Submission, further analysis on spills is required to come up with the priority spill measure. Nevertheless, the number of priority spills could potentially be another measure adopted by the case utility to supplement the existing spill measures.

Another example of this gap relates to the measure for the utilization of solid combustion by-product. Under both the Sustainable Development Report and the ECR Program Annual Report, percentage data on the reuse of solid combustion by-product is presented and discussed. At the corporate and business unit level within the case utility, there are no environmental measures or objectives in the business plans that align with this measure or efforts to maximize the reuse of waste wherever possible. It may not be logical to have a corporate level measure for the re-use of solid combustion by-product because it applies only to thermal generation under the Energy Supply Business Unit. This seems to be a key environmental performance indicator to be reported, and it should potentially align with measures under the Energy Supply Business Unit Business Plan. The line can be drawn from material recycling and reuse to the EM policy's commitment to minimize pollution; however, there is no cascading corporate level objective or "mother statement" related to maximizing material recycling and reuse, or minimizing hazardous waste disposal.

In terms of EPR efficiency, in reviewing both the Sustainable Development Report and the Annual Report, there is considerable overlap between the two. Information and data presented in the Sustainable Development Report could potentially

be included in the Annual Report. There may be some alignment issues with reporting of environmental measures and reporting at the end of a fiscal year. Therefore, a supplement encompassing certain environmental performance measures may be required in addition to what is included in the Annual Report. The notion is that publicizing environmental performance could be covered in one report, thereby eliminating duplication efforts and redundancy in external EPR. Furthermore, there does not seem to be high priority in the timely production of the Sustainable Development Report since the latest version is three years out of date, and since, as a side project, it may not take priority over the responsible employee's other duties.

There does not seem to be any deficiencies in terms of the flow of EPM data and information to external report preparation personnel. For the most part, External Report Leads have been established logically with report preparation responsibilities falling under personnel associated with the content of the reports. The Public Affairs Department should delegate the preparation of the Annual Report's environmental section to key personnel involved with the performance and/or EM activities being reported. This would facilitate REIMSAP application in that the collection of EPM data and information would be integrated for both BP and external EPR cycles.

It can be concluded that the REIMSAP model can apply to and can facilitate the case utility's external EPR systems. To apply REIMSAP, reporting measures should be aligned with BP measures, and the report preparation responsibilities should be logically established so that there is an integrative link between report preparation and EPM compilation, analysis and communication.

5.4.4 Case Utility Analysis of REIMSAP Application for IMS

The case utility has established a BP cycle that is aimed at integrating the planning and result-based checking for various corporate goals. At the corporate and business unit levels, there are performance measurement teams that comprise performance coordinators for the goals. They are responsible for collecting, analyzing and communicating relevant performance data and information for the BP processes. This structure and measurement activity is conducive to the application of the REIMSAP model applied to an IMS.

The case utility has developed a list of suppliers or measurement team personnel for the corporate and business unit level BP processes. Auditors could be facilitated by an expansion of this list that also includes internal responsibilities related to controls, responsibilities related to regulatory compliance, resident experts on the corporate goals and priorities, resident experts on specific fields and issues, and specific Department and Division Managers accountable for the performance of high-priority programs and objectives. This contact list could be used as a directory for audit SCCD.

In the case utility, there are EM initiatives and controls that are not necessarily planned or reviewed through the BP cycle. For instance, there may be business area specific core operational activities that do not align with higher level objectives, measures or programs. This does not diminish the fact that the case utility will continue to undertake localized processes to plan and review such activity. As an example, the case utility has localized processes to establish compliance performance. The EM policy has a commitment to comply with applicable environmental regulations; however, there are no objectives in the CSP to maintain or improve compliance performance, nor are

there measures to track non-compliances. This reflects the fact that the CSP is a publicity tool in addition to an internal policy tool. Business plans define action. They will not necessarily define all processes and on-going activities that are inherent to the accomplishment of goals and objectives. In such cases, the use of the BP cycle in audit planning may only lead to direction rather that absolute audit scope, coverage and criteria information. With the REIMSAP model SCCD process, primary suppliers can provide insight into performance data and information, issues of concern, and direction on accountability and responsibility. Secondary suppliers can better define processes, issues of concern and audit criteria because they are tied into the development or functioning of the processes.

The case utility's audit program is not necessarily conducive to the application of the REIMSAP model for management systems other than an EMS. There has never been an explicit quality audit or an audit of safety management throughout the entire case utility. The comprehensive auditing function in the case utility has narrow scope. Through comprehensive auditing, there may be findings related to quality management, safety management, EM, human resource management, and others. Nevertheless, such findings may lack value because they are localized and do not consider a full system perspective.

In an energy utility, management system auditing cannot be accomplished through simple checklists. Not all systems are standardized, and there needs to be a push towards auditing by process, program, and issue. This means that there is a learning curve for auditors because they should understand what they are auditing. This requires that auditors consult those with responsibility related to action or process planning, those

accountable for activity performance, those responsible for directing the implementation of activity, and those who can provide insight into related performance concerns. If an energy utility conducts internal process and program-type auditing under an overall system-assessment program, then the REIMSAP model can potentially be applied to other management areas and systems beyond an EMS.

The REIMSAP model can apply to and can facilitate the integration of management systems in the case utility. The REIMSAP model in conjunction with BP cycles in the case utility can be used as a basis for an IMS. However, to support an IMS, the case utility's internal audit program needs to be refined to support a management systems auditing program. REIMSAP applied to an IMS could then ensue.

5.5 Discussion on REIMSAP and Case Utility Analysis Validity

In developing the REIMSAP model, the literature survey served partially as an instrument of validation. In other words, the author attempted to develop a unique model serving to fill gaps in previous research. The study of the case utility's EPM systems also served as an instrument of validation in that the REIMSAP model was developed to enhance existing EPM practices and to deal with inefficiencies based on case reality. If the case utility were to implement such a model, further validation is required. A pilot REIMSAP program could be implemented first to provide assurance that such a system does enhance existing EPM practices and does constitute a valid model for integrated EPM.

There may be inherent biases in the REIMSAP model and the case utility analysis. One reason for this is that the interview process focused only on personnel with

responsibilities related to EM. As a result, there may be issues related to other management systems that were overlooked. For example, none of the members of the Executive Management Committee were interviewed. This Committee is concerned with all pillars of the triple bottom line, whereas interviewees related to EM may only be concerned with the case utility's interaction with the environment. Another reason for bias is that the author is not an auditor and has received no formal training in EMS auditing. As a result, the REIMSAP model may contradict traditional EMS auditing, and there may be coverage and scope issues that were overlooked in the REIMSAP EMS audit categorization scheme and SCCD directory.

5.6 Summary

This chapter has presented case utility analysis of the application of the REIMSAP model and its supporting material. The case utility analysis methodology was described. The case utility background was then presented, followed by a description of the case utility's result and system-based EPM processes. Based on the study of existing EPM practices, REIMSAP applicability to the case utility was analyzed and supported with a gap analysis. REIMSAP applicability to BP, existing audit functions, EPR and IMS within the case utility was analyzed with reference to the gaps identified. Finally, a discussion on the validity of the REIMSAP model and the case utility analysis was presented.

6.0 Conclusions

This chapter discusses the main contributions of the research that was presented in this thesis, followed discussion on research limitations and recommendations for future research.

6.1 Contributions of the Research

Chapter Three presented the conceptualization of a model for the integration of result and system-based EPM in an energy utility. The linkages between result and system- based EPM were analyzed, and the Result-Enhanced Internal Management System Audit Program (REIMSAP) model applied to EMSs in an energy utility was presented. The REIMSAP model was supported by a case specific EMS audit categorization scheme. It was also supported by a case specific directory for an internal EMS audit SCCD process needed to integrate result-based EPM considerations into EMS audit planning.

In Chapter Four, the application of the REIMSAP model to BP and EPR cycles was discussed. A conceptual model depicting REIMSAP integration with BP and EPR cycles was presented. It was concluded that the REIMSAP model can be integrated with and can facilitate both business planning and EPR in an energy utility. Next, the REIMSAP model was analyzed as a basis for integrating management systems and supporting assessment methodologies. Conceptual models were presented depicting REIMSAP applied to the systems model for IMS and REIMSAP applied to an IMS in an energy utility. It was concluded that the REIMSAP model can facilitate an integrative approach to systematic-assessment in an energy utility provided that the linkages between

PM streams, audit coverage, and audit scope for different management systems are identified.

Chapter Five presented discussion on the application of the REIMSAP model within a case utility. Case utility EPM processes were analyzed. Based on this analysis, a REIMSAP gap analysis was presented for the case utility. REIMSAP applicability to the case utility's existing audit functions, BP cycle and EPR processes were then discussed. Finally, a case utility analysis of REIMSAP application for the integration of management systems was presented. The theoretical application of the REIMSAP model within the case utility led to the following conclusions:

- The REIMSAP model can apply to the case utility's EPM structure and processes; however, there are gaps and inefficiencies (see Table 5-1) that need to be addressed for successful implementation.
- The REIMSAP model has the ability to strengthen the case utility's internal EMS audit program by improving the audit sample based on the integration of result-based EPM considerations into EMS audit planning processes.
- The REIMSAP model can be integrated with the case utility's BP processes provided that measures improve and serve to identify environmental risks.
- The REIMSAP model can apply to the case utility's external EPR programs provided that report preparation responsibilities are logically established (i.e. Where possible, reporting responsibilities aligned with EPM collection, analysis and communication responsibilities) and provided that reporting measures align with internal measures.
- The REIMSAP model in conjunction with BP cycles in the case utility can be used as a basis for an IMS; however, the existing internal audit program needs refinement to

allow for joint auditing of internal management systems. Accordingly, efforts should be made to identify filter personnel for the flow of PM streams for other management systems and to categorize coverage and scope for other management system audits .

6.2 Limitations of the Research

Assumptions have been made that limit this research. Notably, this research is based on case utility analysis within one energy utility. Based on the case utility, this research assumes a fully-integrated energy utility. Due to the multitude of factors that differentiate energy utilities, parallels between the case utility and other utilities need to be drawn to assess REIMSAP application within energy utilities that vary in terms of organizational structure, EPM processes, and management systems.

The REIMSAP model presented applies to EM within an energy utility. Consequently, theoretical propositions on integrating management systems are based on a broad assessment of the relation between EMSs and other management systems. Further analysis on these relations should be made to support the application of the REIMSAP model as a basis for integration.

6.3 Scope for Further Research

The following are recommendations on areas for future research:

- The design of case specific IMS models and supporting methodology.
- The analysis of case specific EMS audit scope, coverage and criteria.
- The design of case specific EPM processes and structures.

- The development of meaningful result-based environmental performance measures for an energy utility and analysis of measure applicability to the REIMSAP model.
- The practical application of the REIMSAP model for internal EMS auditing in energy utilities and analysis of the effects of this application.
- The integration of environmental costs into the REIMSAP model.
- The application of the REIMSAP model on management systems other than an EMS, and examination on the applicability of specific performance measures.

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Appendices

Appendix A:

Supporting Material for the Literature Survey

1.0 Supporting Tables and Figures for Literature Survey

2.0 Supporting Discussion for Literature Survey

1.0 Supporting Tables and Figures for Literature Survey

Table A1: Environmental Strategic Objectives of an Organization (Source: Dias-Sardinha and Reijnders, 2001)

Environmental Strategic Objectives:	*Description:*
Compliance	Compliance with legal regulations and voluntary agreements
Pollution Prevention	Optimization of resource consumption and prevention of wastes
Eco-Efficiency	Minimization of environmental impacts and reduction of resource intensity together with value creation through continuous incremental improvement
Eco-Innovation	Radical environmental improvements in order to achieve minimum environmental impacts
Eco-Ethics	Guiding organizational activities using specified environmentally related normative values such as zero-pollution
Sustainability	Consideration of environmental, social and economic justice between generations and concerning the current generation. Guiding organizational activities so that environmental damage does not compromise resources needed for the growth of current and future generations and providing environmental restoration and remediation when environmental damage is detrimental to the current generation.

Table A2: Examples of Environmental Performance Indicators Applicable to an Energy Utility (Source: Modified from ISO 14031, 1996)

Environmental Performance Indicators (EPIs)
Examples of Management Environmental Performance Indicators:
Implementation of Policies and Programs – Number of achieved environmental objectives and targets – Number of environmental program requirements achieved versus target – Number of contracted service providers with an implemented or a certified EMS
Conformity – Degree of compliance with regulations – Number of non-compliances – Number of resolved and unresolved corrective actions – Number of or costs attributable to fines and penalties
Financial Performance – Costs that are associated with process environmental aspects – Savings achieved through reductions in resource usage, prevention of pollution or waste recycling

Table A2: Continued

Community Relations – Resources applied to support community environmental programs – Number of environmental education programs or materials provided for the community – Score on a corporate citizenship survey given to customers (Weighted)
Examples of Operational Environmental Performance Indicators:
Materials – Quantity of processed, recycled or reused materials – Quantity of hazardous materials used in apparatus maintenance processes – Percentage of electrical insulating oil reused – Percentage utilization of solid combustion by-product from thermal generation
Energy – Quantity of energy units produced (Absolute Data) – Quantity of energy units saved due to demand and supply-side energy conservation programs
Services Supporting the Organization's Operations – Amount of hazardous materials used by contracted service providers – Amount of type of wastes generated by contracted service providers – Amount of recyclable and reusable materials used by contracted service providers
Physical Facilities and Equipment; Supply and Delivery – Average fuel consumption of vehicle fleet – Number of vehicles in fleet with pollution abatement technology
Wastes – Quantity of hazardous waste generated per year or per operational activity (Aggregated) – Total waste for disposal due to construction and operational activity – Quantity of waste converted to reusable material per year or per operational activity
Emissions – Quantity of specific emissions per unit of energy produced or per generating facility (Relative) – Noise measured at a certain location – Quantity of greenhouse gas emission per year as a percentage of baseline year (Normalized)
Effluents to land or water – Quantity of specific material discharged per year or per generating facility – Quantity of waste energy released to water – Quantity of material sent to landfill per construction project or operational activity
Environmental Condition Indicators (ECIs)
Examples of Environmental Condition Indicators:
Air – Contaminant concentration in air measured at a generating facility or at a certain distance from facility – Noise – Temperature – Odour (Qualitative)

Table A2: Continued

Water – Contaminant concentration in groundwater measured at a generating facility site, at a construction site, or at a certain distance from a specific site – Contaminant concentration in surface water – Turbidity units measured at a specific distance from a discharge point – Dissolved Oxygen
Land – Contaminant concentration in soil measured at an equipment servicing facility, construction site, or at a certain distance from a specific site – Erosion – Concentration of nutrients in soil
Flora and Fauna – Contaminant concentration in plant tissue measured at a specific site under the scope of operations of the energy utility – Vegetation quality index – Size of population of particular species per unit area and number of species identified per unit area – Contaminant concentration in animal tissue
Humans, Heritage and Culture – Human health – Erosion of buildings – Damage to sensitive structures

Figure A1: Outline of ISO 14031 EPE Process (Source: ISO/CD 14031, 1996)

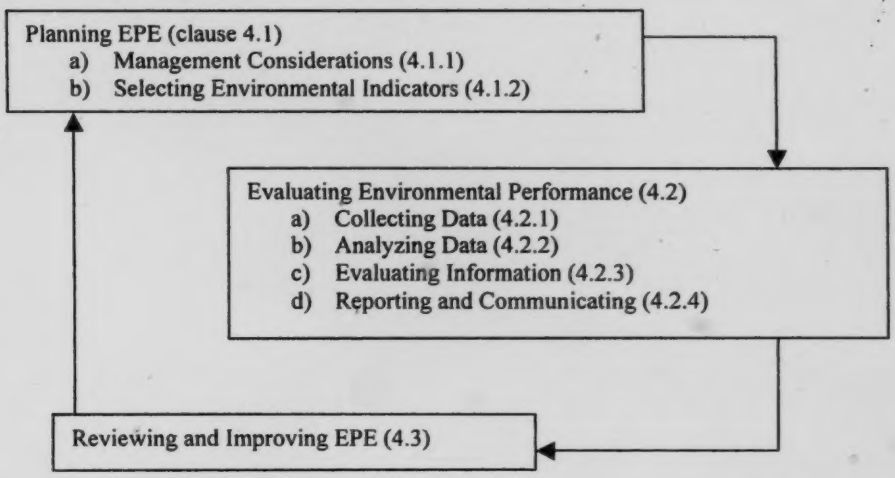

Planning EPE (clause 4.1)
a) Management Considerations (4.1.1)
b) Selecting Environmental Indicators (4.1.2)
Evaluating Environmental Performance (4.2)
a) Collecting Data (4.2.1)
b) Analyzing Data (4.2.2)
c) Evaluating Information (4.2.3)
d) Reporting and Communicating (4.2.4)
Reviewing and Improving EPE (4.3)

Figure A2: Overview of Kuhre's EPE Process (Source: Kuhre, 1998, as referenced by Tam et. al., 2002)

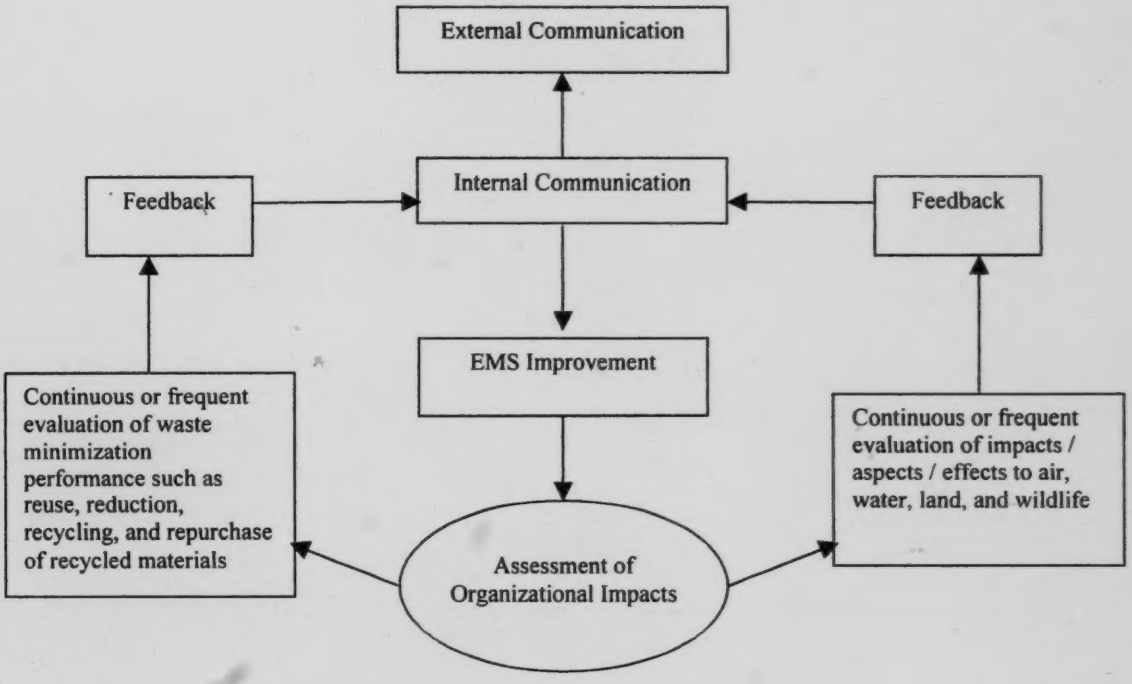
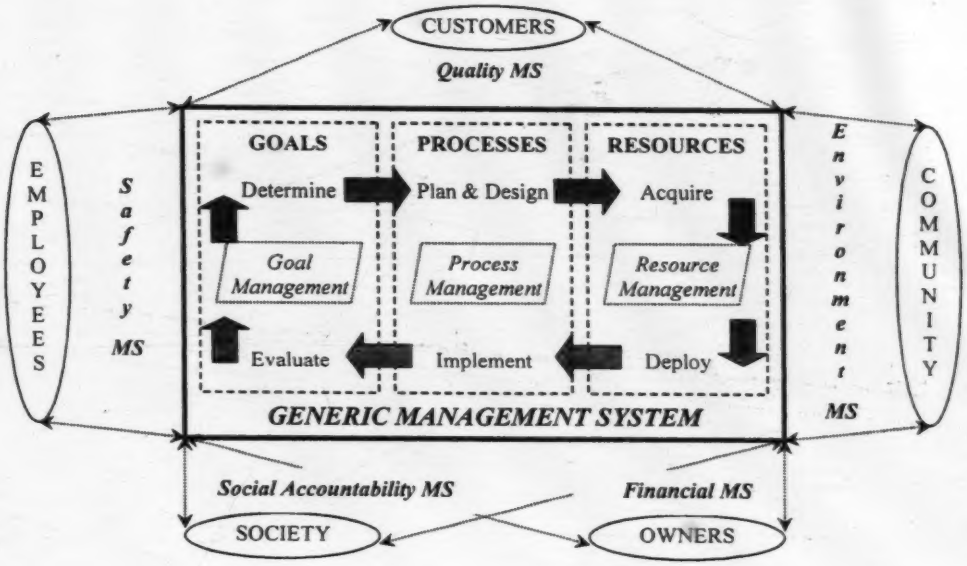

External Communication
Feedback
Internal Communication
Feedback
EMS Improvement
Continuous or frequent evaluation of waste minimization performance such as reuse, reduction, recycling, and repurchase of recycled materials
Continuous or frequent evaluation of impacts / aspects / effects to air, water, land, and wildlife
Assessment of Organizational Impacts

Figure A3: Systems Model for the Integration of Management Systems (Source: Jonker & Karapetrovic, 2004)



2.0 Supporting Discussion for Literature Survey

2.1 Audit Distinctions

It is important to note the distinctions between process based and management system based auditing. A process based audit is conducted to evaluate an operation or method against documented instructions and standards in order to measure conformance to these standards and the effectiveness of the instructions (Russell, 2000). Process audits may be part of an overall management system audit, as they can cover processes that are established as part of an overall management system.

It is also important to note the distinction between compliance-based auditing and EMS auditing. "An environmental compliance audit is a methodical examination to determine whether a company meets applicable legal, regulatory and other environmental requirements such as internal policies or standards" (Wilson, 1999). The differences between an EMS audit and an environmental compliance audit relate to audit criteria and audit scope. According to Wilson, 1999, EMS audit criteria include an EMS standard, and the scope of an EMS audit should cover how legal and regulatory compliance issues are being managed. Environmental compliance audit criteria include specific environmental legislation, and the scope of an environmental compliance audit should verify whether actual legal and regulatory requirements are being met.

Finally, it is important to distinguish between internal and external auditing. Internal audits or first-party audits are an independent appraisal activity established within an organization as a service to the corporation (The Institute of Internal Auditors as cited by Sheahan et. al., 2001). External audits are often referred to as either second or third-party audits. Second-party audits are conducted by, or on behalf of, parties having an interest in the organization being audited (ISO 19011, 2002). Third-party audits are conducted by an external and independent auditing agency (ISO 19011, 2002). In the context of an EMS, third-party audits are often for the purposes of registration or surveillance of conformity.

2.2 Benefits of an IMS

In the literature surveyed, key benefits of an IMS applied to organizations in general are listed as follows:

- Provides time advantages, higher transparency, and cost reduction (Ahsen & Funck, 2001) through more efficient use of resources (Wright, 2001), improved internal management methods (Karapetrovic & Willborn, 1998b), and the streamlining of effort, paperwork and communications (Beckmerhagen et. al., 2003; Griffith, 2000).
- Provides for the reduction and streamlining of multiple audits (Karapetrovic & Willborn, 1998b; Winder, 2001)
- Improved cross-functional teamwork (Karapetrovic & Willborn, 1998b; Wright, 2000) that facilitates sharing of information across traditional organizational boundaries (Griffith, 2000), technology development and transfer, and joined operational performance (Karapetrovic & Willborn, 1998b).
- Enhanced confidence of customers, positive market and/or community image (Karapetrovic & Willborn, 1998b; Winder, 2001), and improved industry-government and public-community relations (Winder, 2001).
- Reduction of fuzzy management boundaries between individual systems and broadening of the horizon beyond the functional level of any individual systems (Griffith, 2000).
- Facilitates the introduction of other management systems using existing framework as a springboard to implementation (Block & Marash, 1999; Karapetrovic & Willborn, 1998b; Winder, 2001; Dale & Wilkinson, 1999).

2.3 Case Specific IMS Considerations

Case specific considerations that should be addressed by IMS methodology are as follows (Karapetrovic, 2002):

- The scope of integration (i.e. What management systems should be included in the IMS).
- The extent or degree of integration required (i.e. Integrated documentation, aligned core processes, objectives and resources, all-in-one system…etc.).
- The sequence of integration (i.e. QMS first followed by other management systems, EMS first followed by other management systems, simultaneous QMS and EMS followed by other management systems, or common IMS core with IMS modules for function specific elements).
- The degree of integration at different organizational levels (i.e. Full integration at corporate and operational levels and partial integration at middle-management levels).

2.4 Expanded Discussion on Critical Issues Facing Energy Industry

Countries or areas that have undertaken electricity market restructuring include the U.S., the United Kingdom, New Zealand, Norway, Sweden, parts of Canada and Australia, and much of Central and South America (Kaplan, 1998). Deregulation can induce price volatility, but can increase overall efficiency and stimulate innovation (Kaplan, 1998). It affects the energy market (e.g. volatile prices and the evolution of power trading), as well as utility organization and structure (e.g. strategic mergers, acquisitions and alliances) (Sioshansi, 2000). For studies on the effects of electric industry deregulation, the reader is referred to Studness, 2001; Sioshansi, 2000; Kaplan, 1998; and Carson, 1998.

In an energy utility, the concept of sustainability drives action and decision making, and it may constitute the rationale for PM. Furthermore, environmental, social and economic dimensions of sustainability interact with one another, leading to a potential need for an integrative approach to sustainability management. Hence, sustainability links different sub-systems of an overall business management system and can be considered a driving force behind integrated management in the energy industry. For detailed discussion on sustainability as it applies to electric utilities, the reader is referred to the World Business Council for Sustainable Development (WBCSD) report on "Sustainability in the Electricity Utility Sector" (WBCSD, 2002).

In terms of GHG emission management, Canada is a party to the United Nations Framework Convention on Climate Change (UNFCCC). The Kyoto Protocol was negotiated at the Third Conference of the signatories to the UNFCCC in 1997 and signed by Canada in 1998 (Government of Canada, 2001). If the Kyoto Protocol is ratified and comes into force, it would set binding targets for GHG emissions for the period 2008 to 2012 (Government of Canada, 2001). Canada's commitment under Kyoto is to reduce anthropogenic GHG emissions to 6% below 1990 baseline levels (Government of Canada, 2001). GHG emission reduction initiatives affect generation development planning, research and development initiatives, customer and internal services (e.g. supply and demand-side management initiatives), and export power strategies. Consequently, GHG emission management considerations factor into facets of environmental and other management systems, thereby supporting an IMS approach.

Appendix B:

Discussions on Result and System- Based EPM

1.0 Discussion on Result-Based EPM Network Development

2.0 Discussion on EMS Audit Program Development

3.0 Discussion on EMS Audit Process Sequence and Practices

1.0 Discussion on Result-Based EPM Network Development

1.1 Introduction

An EMS is a management tool that provides a construct for managing environmental performance. Under an ISO 14001 EMS, organizations are required to "establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of its operations that can have a significant impact on the environment" (ISO/DIS 14001, 2003). This is accomplished through result-based EPM, which is a process involving the physical measurement, collection, communication, analysis, assessment, and application of environmental performance data and information. In an energy utility, result-based EPM is used in planning and reviewing EM objectives and action, demonstrating compliance with environmental legislation, identifying risk areas and improvement opportunities, and gauging the effectiveness of EM controls. The ISO 14001 standard does not prescribe that indicators of performance be used to monitor and measure environmental performance; however, in the context of an energy utility, the use of environmental performance indicators (EPIs) is implied by best practices and measurement activities associated with environmental regulatory compliance.

Result-based EPM can be perceived as a sub-system of an EMS. To succeed, it is imperative that the appropriate information be provided at the right levels and to the right people in order to guide informed decision making that may impact the environment. A rigorous result-based EPM system involves networked structures and processes that drive the flow and application of EPM data and information.

Result-based EPM occurs at all levels throughout an energy utility. Regardless of the type of energy utility, organizational structure will break the company down into manageable functional sub-sections or business areas. Because the case utility analysis (see Chapter 5) focuses on a fully-integrated energy utility, model conceptualization assumes an organizational structure with high level business units covering generation, transmission and distribution, corporate service, customer service and marketing, and finance and administrative responsibilities. The scope of a business unit is assumed to be broken down further into functional divisions supported by interrelated departments.

In a large energy utility with various environmental aspects and potential impacts, EPM activities vary. There are characteristics that define EPM at different levels and in different business areas. Figure B1 depicts a flowchart highlighting key considerations for developing or defining a result-based EPM network in an energy utility. This presents a contribution of this research in that Figure B1 provides a complete and broadly applicable overview of result-based EPM development. It is supported by applicable alternatives for an energy utility that have been derived from case utility analysis (see Chapter 5). This type of overview was not found in the literature surveyed. This has been excluded from the main text because the development of an EPM network is not a central focus of the research.

The EPM network considerations and energy utility alternatives identified in Figure B1 are addressed in the following sub-sections.

Figure B1: Overview of Considerations for Developing an EPM Network in an Energy Utility

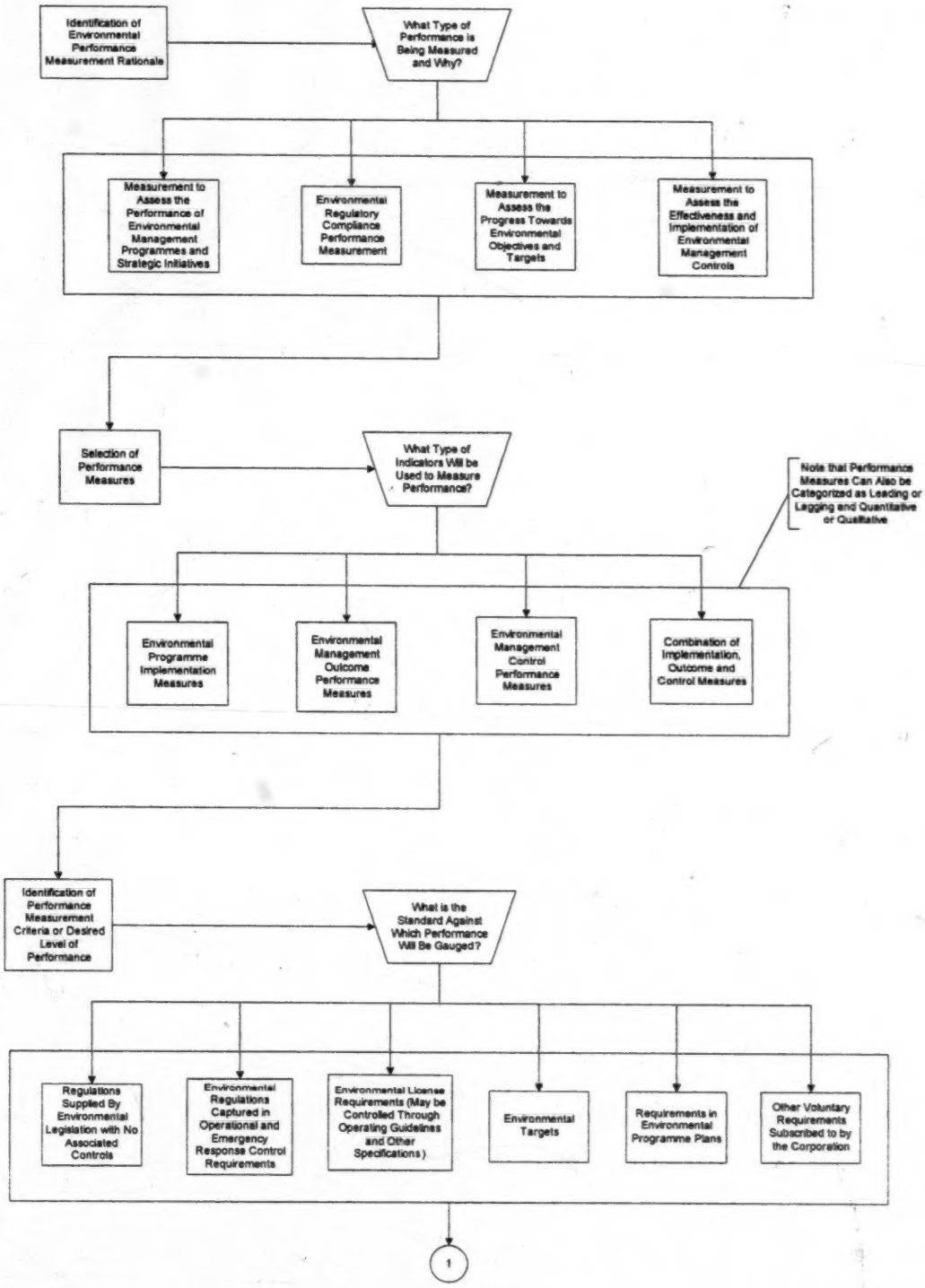

Identification of Environmental Performance Measurement Rationale
What Type of Performance is Being Measured and Why?
Measurement to Assess the Performance of Environmental Management Programmes and Strategic Initiatives
Environmental Regulatory Compliance Performance Measurement
Measurement to Assess the Progress Towards Environmental Objectives and Targets
Measurement to Assess the Effectiveness and Implementation of Environmental Management Controls
Selection of Performance Measures
What Type of Indicators Will be Used to Measure Performance?
Note that Performance Measures Can Also be Categorized as Leading or Lagging and Quantitative or Qualitative
Environmental Programme Implementation Measures
Environmental Management Outcome Performance Measures
Environmental Management Control Performance Measures
Combination of Implementation, Outcome and Control Measures
Identification of Performance Measurement Criteria or Desired Level of Performance
What is the Standard Against Which Performance Will Be Gauged?
Regulations Supplied By Environmental Legislation with No Associated Controls
Environmental Regulations Captured in Operational and Emergency Response Control Requirements
Environmental License Requirements (May be Controlled Through Operating Guidelines and Other Specifications)
Environmental Targets
Requirements in Environmental Programme Plans
Other Voluntary Requirements Subscribed to by the Corporation
1

Figure B1 – Continued

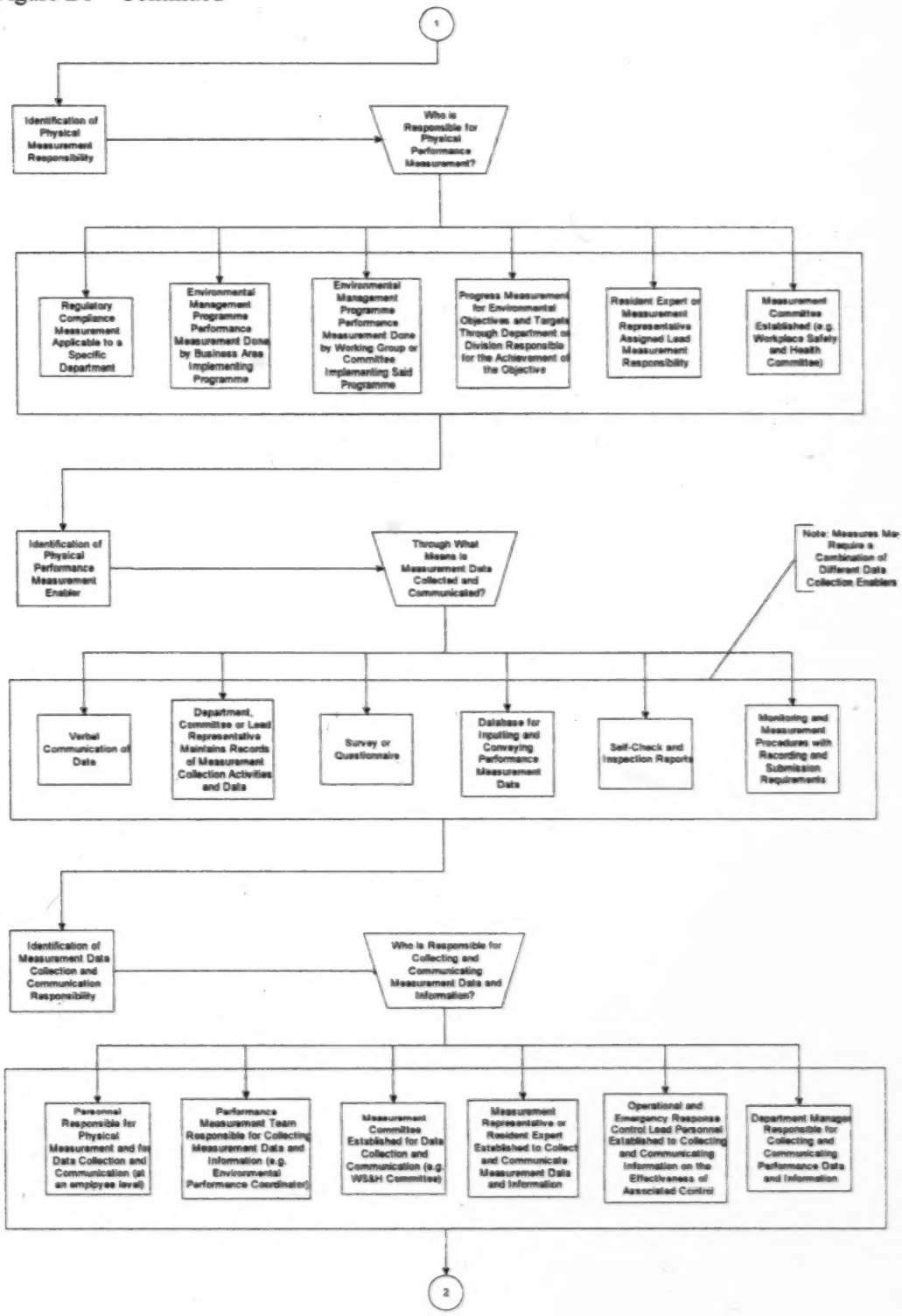
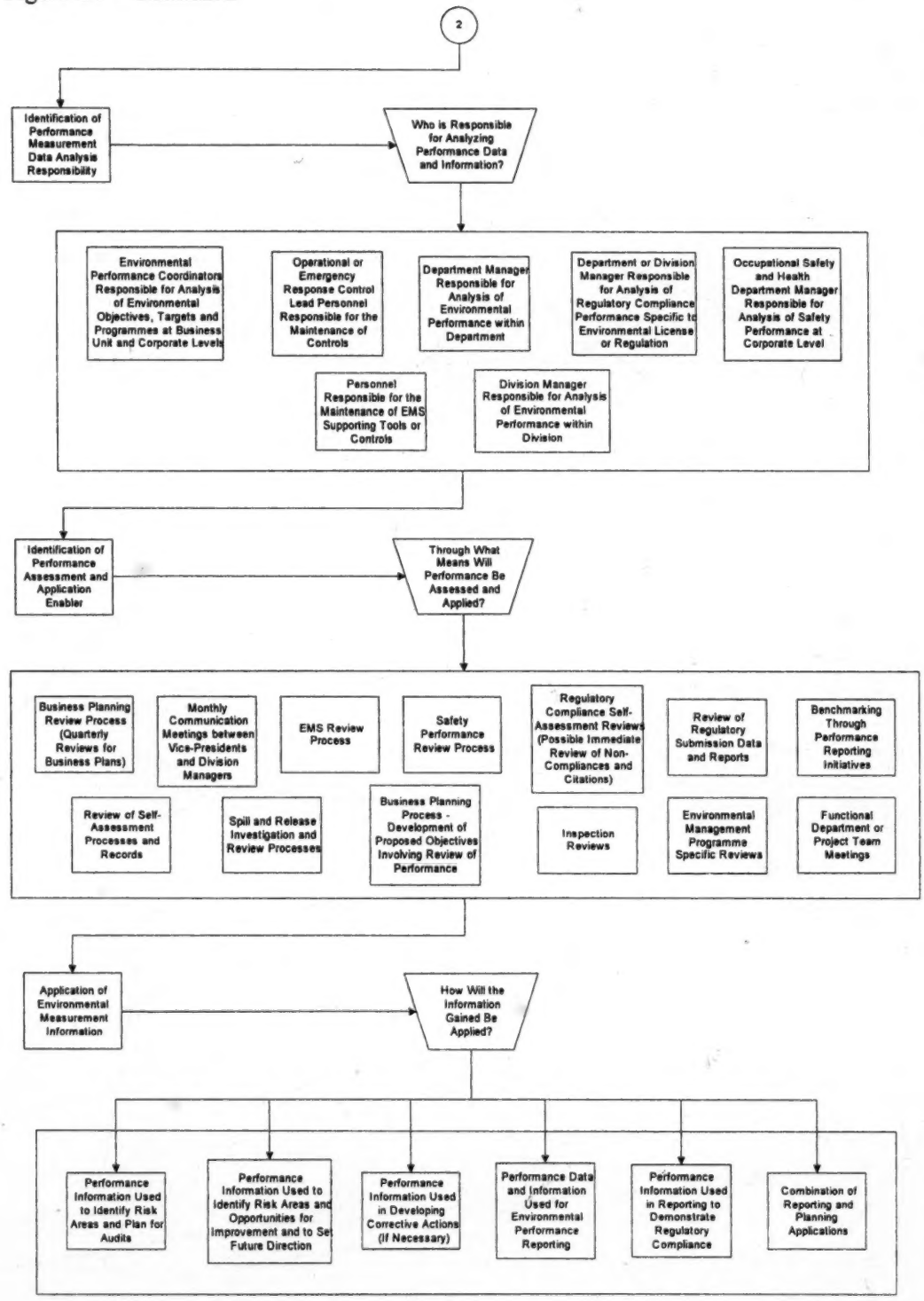

1
Identification of Physical Measurement Responsibility
Who is Responsible for Physical Performance Measurement?
Regulatory Compliance Measurement Applicable to a Specific Department
Environmental Management Programme Performance Measurement Done by Business Area Implementing Programme
Environmental Management Programme Performance Measurement Done by Working Group or Committee Implementing Said Programme
Progress Measurement for Environmental Objectives and Targets Through Department or Division Responsible for the Achievement of the Objective
Resident Expert or Measurement Representative Assigned Lead Measurement Responsibility
Measurement Committee Established (e.g. Workplace Safety and Health Committee)
Identification of Physical Performance Measurement Enabler
Through What Means is Measurement Data Collected and Communicated?
Note: Measures May Require a Combination of Different Data Collection Enablers
Verbal Communication of Data
Department, Committee or Lead Representative Maintains Records of Measurement Collection Activities and Data
Survey or Questionnaire
Database for Inputting and Conveying Performance Measurement Data
Self-Check and Inspection Reports
Monitoring and Measurement Procedures with Recording and Submission Requirements
Identification of Measurement Data Collection and Communication Responsibility
Who is Responsible for Collecting and Communicating Measurement Data and Information?
Personnel Responsible for Physical Measurement and for Data Collection and Communication (at an employee level)
Performance Measurement Team Responsible for Collecting Measurement Data and Information (e.g. Environmental Performance Coordinator)
Measurement Committee Established for Data Collection and Communication (e.g. WS&H Committee)
Measurement Representative or Resident Expert Established to Collect and Communicate Measurement Data and Information
Operational and Emergency Response Control Lead Personnel Established to Collecting and Communicating Information on the Effectiveness of Associated Control
Department Manager Responsible for Collecting and Communicating Performance Data and Information
2

Figure B1 – Continued


2
Identification of Performance Measurement Data Analysis Responsibility
Who is Responsible for Analyzing Performance Data and Information?
Environmental Performance Coordinators Responsible for Analysis of Environmental Objectives, Targets and Programmes at Business Unit and Corporate Levels
Operational or Emergency Response Control Lead Personnel Responsible for the Maintenance of Controls
Department Manager Responsible for Analysis of Environmental Performance within Department
Department or Division Manager Responsible for Analysis of Regulatory Compliance Performance Specific to Environmental License or Regulation
Occupational Safety and Health Department Manager Responsible for Analysis of Safety Performance at Corporate Level
Personnel Responsible for the Maintenance of EMS Supporting Tools or Controls
Division Manager Responsible for Analysis of Environmental Performance within Division
Identification of Performance Assessment and Application Enabler
Through What Means Will Performance Be Assessed and Applied?
Business Planning Review Process (Quarterly Reviews for Business Plans)
Monthly Communication Meetings between Vice-Presidents and Division Managers
EMS Review Process
Safety Performance Review Process
Regulatory Compliance Self-Assessment Reviews (Possible Immediate Review of Non-Compliances and Citations)
Review of Regulatory Submission Data and Reports
Benchmarking Through Performance Reporting Initiatives
Review of Self-Assessment Processes and Records
Spill and Release Investigation and Review Processes
Business Planning Process - Development of Proposed Objectives Involving Review of Performance
Inspection Reviews
Environmental Management Programme Specific Reviews
Functional Department or Project Team Meetings
Application of Environmental Measurement Information
How Will the Information Gained Be Applied?
Performance Information Used to Identify Risk Areas and Plan for Audits
Performance Information Used to Identify Risk Areas and Opportunities for Improvement and to Set Future Direction
Performance Information Used in Developing Corrective Actions (If Necessary)
Performance Data and Information Used for Environmental Performance Reporting
Performance Information Used in Reporting to Demonstrate Regulatory Compliance
Combination of Reporting and Planning Applications

1.2 What performance is being measured and why?

In an energy utility, result-based EPM is undertaken for a variety of reasons. Result-based EPM can be broadly categorized as measurement to assess perception, regulatory compliance performance, the performance of environmental programs and local improvement initiatives, the effectiveness and implementation EM controls, and progress towards the achievement of environmental objectives and targets.

Measurement to assess customer and/or employee perception related to EM is undertaken to assess whether the EM efforts of an energy utility are being recognized and accepted. This is not a requirement for an energy utility. It may be done partly as a promotional tool or to obtain stakeholder feedback on EM. Perception measurement is not included in Figure B1 because it is typically integrated with other perception measurement processes such as customer and employee satisfaction surveying.

Certain measures of regulatory compliance performance are required by law due to potential environmental impacts that could be caused by particular activities of a company. In an energy utility, the concept of regulatory compliance refers to adherence to environmental licenses such as construction permits and operating licenses, and to applicable environmental regulations governing specific operational activities such as Provincial Fires Prevention Act regulations. Through environmental assessment and licensing processes, depending on the nature of the licenses being sought, there may be environmental protection and mitigation plans established to procure or maintain the licenses. The concept of regulatory compliance also refers to adherence to such plans.

The measurement of regulatory compliance overlaps with measurement processes defined in operational control documentation and measurement to gauge the effectiveness of operational controls. Most environmentally related operational controls are based on complex legislation that has been simplified into "how-to" guideline and procedural documentation. In an energy utility, there are core operational controls that are applicable to the operational scope of all or the majority of business units. An example of this would be operational control practices for the handling of hazardous wastes. There are also operational controls that are specific to the operations of certain business areas. An example of this is procedural manuals for transmission line maintenance. Operational controls define procedures, guidelines and requirements that guide functional activities and should be followed to safeguard employee and environmental health. Compliance to regulation may be gauged through assessment of operational control outcomes, implementation and effectiveness. Note that assessment of effectiveness can involve assessment of outcome, capability, efficiency, suitability, and adequacy.

Environmental programs are strategic actions or initiatives defined and implemented to achieve set environmental objectives and targets. They can be focused internally or externally depending on what is to be accomplished. One must assess the progress of environmental programs to assess whether progress is being made towards the achievement of environmental objectives and targets. There is no requirement in ISO 14001 for the documentation of environmental programs, and any documentation of programs is left to the interpretation of the corporation implementing the standard. Despite this lack of required documentation, measures should be established to quantify the current state of program implementation and to quantify the outcomes of program implementations. Program measurement should convey what has been accomplished, what remains to be accomplished, whether programs are effective, and whether programs are being implemented according to planned arrangements. If quantitative measures do not exist to assess program performance, qualitative measurement and feedback is necessary.

Local environmental improvement initiatives are essentially smaller scale environmental programs that can be accomplished within a narrow scope of the corporation and without consuming substantial resources. PM for local environmental improvement initiatives is accomplished using the same processes as measurement for environmental program performance.

Environmental objectives may require the implementation of several environmental programs and local improvement initiatives to achieve the desired target. The execution of environmental programs facilitates the achievement of environmental objectives and targets. Effective result-based EPM should

assess the performance of program implementation and should use this information to quantify or assess whether objectives have been accomplished and targets have been met.

1.2 What are the measures of performance and what is their nature?

Defining the actual measures of performance requires careful thought into what needs to be measured. Result-based measurement should be of value to a corporation. One must ask the questions "what does this measure tell us and how is it useful?" It is important to avoid the trap of measuring for the sake of simple measurement without considering the value adding potential. Arguably the most important criteria for measures are that they be meaningful and justifiable. The raw data collected from physical measurement of performance does not provide value without being applied and used in decision making. The development of EPIs is beyond the scope of this research; however, the use of EPIs in an energy utility is a primary focus of this research. It is important to ensure that measures convey the appropriate data. Ideally, a corporation should have criteria and a design process for the development of measures. In reality, measures may be designed in a non-systematic manner based on the intuition and experience of those developing the measures.

As discussed in the literature survey, there are various types and categories of measures. The selection and nature of measures depend on the performance data and information sought. A clear result-based EPM network should have a categorization scheme for environmental performance measures. Table B1 below presents and describes a simplified categorization scheme for environmental performance measures relevant to energy utilities. This categorization scheme was developed based on the author's interpretation of EPM activities and measures within the case utility. It is a contribution of the research in that no energy utility case specific categorization schemes were found in literature. Furthermore, it simplifies existing measurement categorization schemes. This has been excluded from the main text because the categorization of environmental performance measures is not a primary focus of the research.

Perception measures can be categorized under outcome performance measures. Perception measurement is lagging. It is typically undertaken through employee and customer surveys that convey quantitative information based on a questionnaire scoring scheme and limited qualitative feedback associated with the survey questions. Depending on the detail of perception survey questions, apart from the qualitative feedback from survey participants, perception measurement will not provide information on which a company can act.

Table B1: Categorization Scheme for Environmental Performance Measures in an Energy Utility

Type or Grouping of Environmental Performance Measure	Description
Environmental Management Activity Measures	Leading or in-process measures that convey status, effectiveness and efficiency information related to EM initiative and program implementations. Can be qualitative or quantitative.
Environmental Operational and Emergency Control Performance Measures	Leading or lagging measures that assess the performance (in terms of implementation and effectiveness) of EM controls such as guidelines, procedures, operational control documents and emergency protocols. Typically qualitative measurement, but can be quantitative through self-assessment indexing.

Table B1: Continued

Environmental Management Outcome Performance Measures	Lagging measures that quantify the results of environment management initiatives (e.g. achievement of objectives and programs and the outcome of certain compliance adherence processes), the effectiveness and efficiency of the actions implemented to achieve the results, and the condition of the environment. Typically quantitative measures. May be common to various industries and operations. Environmental targets are typically set for outcome measures.

1.3 What are the performance criteria?

Performance criteria are needed to set environmental objectives and targets. Performance criteria define what is to be accomplished and the standard against which performance will be measured. Criteria varies according to what is being measured and why.

If regulatory compliance performance is being measured for a particular operating or construction license, there are set limits under which a corporation must operate. These limits define the performance criteria. To prove compliance with such licenses, measurement is required and recorded data may need to be submitted to governing or regulating agencies.

Underpinning the operations of an energy utility is environmental regulation that governs specific situations and activities. For example, an energy utility can operate a hydro-electric generating station according to set limits defined under its applicable Water Power Act License. This does not guarantee that limits will be met or emergency situations will be averted. Therefore, a hydro-electric generating station will have operational controls that guide activities and processes that affect employee safety and the environment. There will also be emergency response controls that guide employee actions in emergency situations.

In an energy utility, environmental regulations may be simplified and captured under operational control and emergency protocols. Operational and emergency controls are developed and maintained by internal experts with either responsibilities associated with the environmental regulations upon which the controls are based or responsibilities associated with the activities to be controlled. For example, operational control documentation for the transportation of dangerous goods could be maintained by a Corporate Transportation of Dangerous Goods Officer, while operational control for the hydraulic operation of a generating station could be maintained by a Hydraulic Engineering and Operations Department. For operational and emergency controls, the stipulations and requirements defined in control procedures, codes of practice and guiding documentation will form the basis of performance criteria for operational control. The associated measurement involves an assessment of whether the defined requirements are being implemented and whether or not they are effective. There may be specific reporting requirements for non-licensable operational environmental statutes that form the basis of operational control and emergency control.

Regardless of geographic location, there will always be numerous environmental statutes to which an energy utility must subscribe. Environmental compliance programs and statutes will vary in relation to regulations, measurement and operational requirements, and submission obligation.

For environmental objectives, targets typically define the criteria against which performance is measured; however, it is not so black and white. Not all environmental objectives will have an associated target and various objectives may affect one target. For example, an environmental objective such as "improve working relationships with the Department of Fisheries and Oceans" does not necessarily lend itself to result-based EPM or an associated target. It may be broken down into a combination of several inter-linked environmental objectives at lower organizational levels. Measurement of progress towards the

achievement of environmental objectives may be qualitative and based on program measurement activities and feedback from lower organizational levels.

Environmental program PM is gauged against the performance criteria defined through program planning. Before an environmental program is implemented, it is vital to consider the characteristics that define successful implementation of said program. Program measurement can also fall into the same grey area as measurement to assess the progress towards environmental objectives. Not all programs will have an associated leading indicator of progress or lagging outcome measure. The assessment of program performance may be based entirely on qualitative information.

Measurement of perception is typically gauged through surveys using an index rating. Organizations will usually have a desired target index level that defines performance criteria. Perception measurement does not convey what areas are performing, and the achievement of the index target cannot readily be delegated to particular business areas. The application of perception measurement is limited, and this is another reason why perception measurement has been excluded from Figure B1.

The supplier of the environmental performance criteria is also an important consideration. Regulations change, targets are perpetually moving so that companies strive to improve, new environmental objectives and programs evolve, and existing programs may change. The ability to be prepared for and to adapt to such changing conditions requires some level of interaction between those who set performance criteria and those who are responsible for achieving or adhering to the criteria.

1.4 Who is Responsible for Physical Measurement?

Physical measurement activities are typically the responsibility of line employees or measurement delegates. In other words, most measurement data originates from measurement processes undertaken at a departmental level. To varying degrees, the use of the data and the assessment of performance require judgment and input from management or expert employees. For instance, a line employee measuring the water quality of a water body downstream of a hydro-electric generating station may not need input from management to know that dissolved oxygen content is not within prescribed limits; however, a line employee may not have the competency to determine the cause of such deviation and possible corrective actions. An energy utility using result-based EPM must assess at what level measurement becomes meaningful. A Vice-President within a corporation does not necessarily need to know that dissolved oxygen was below prescribed limits; however, if this is recurring and is the case at several different generating stations, this information becomes meaningful to management. The rationale for this is that a regulator could issue a formal order, warning or citation affecting operations, or there may be a root cause for non-compliance and corrective action must be taken.

Part of justifying measurement activity is determining where measurement data should originate and where the information can be applied. For measurement activities related to regulatory compliance, it may be logical that physical measurement be undertaken by departments and divisions that are specifically related to the regulations being monitored for compliance. For instance, the department within an energy utility responsible for hydraulic operations should logically be responsible for maintaining compliance under the Provincial Water Power Act Licenses and the Federal Navigable Waters Protection Act. Unfortunately, there are some difficulties in determining the logical responsibility for physical measurement because responsibilities can shift. For instance, the procurement of an interim license under the Provincial Water Power Act may fall under a department with planning and licensing responsibilities, whereas the procurement of a final license and the maintenance of said license may fall under the department with hydraulic operation responsibilities.

Measurement activities to assess program performance should be logically undertaken by the business areas, working groups, or committees implementing said programs. Furthermore, responsibility for assessing performance in achieving environmental objectives and targets depends on the level at which the objectives and targets have been set. At department and division levels, measurement activity should be delegated by the Department or Division Manager. At business unit and corporate levels, EPM data and

information stems from measurement activity at lower organizational levels. To act as a filter, the compilation of EPM data and information should be delegated to an assigned EPM representative or Environmental Performance Coordinator (EPC).

The need for efficient measurement creates circumstances where physical measurement activities should piggyback existing measurement enablers. An existing measurement system, such as one for a safety management system (SMS), may overlap with result-based EPM for an EMS. It is more efficient to utilize an existing system rather than duplicating the effort. In such cases, there may be cross-functional measurement committees or teams responsible for physical EPM. Physical measurement should be optimized so that it is efficient and economical, as well as logically established.

1.5 Who is Responsible for Data Collection and Communication?

With physical measurement activities being undertaken at a department or individual employee level, data compilation and communication may be separate. For certain circumstances, the personnel responsible for physical measurement may be responsible for compiling and communicating data. For example, a departmental EM program may have one employee responsible for implementation. That person could be the sole responsibility for physically measuring performance data. If the program is not cross-functional and there is only one performance data stream, then the person responsible for implementation could be responsible for compiling all the data and reporting it directly to the Department Manager responsible for analyzing the data and directing action.

The communication of EPM data and information should flow upwards through organizational levels. For instance, a Department Manager should be communicating performance data and information to their Division Manager. Likewise, there should be a link between divisional performance and business unit performance. There should be dedicated representatives or EPCs charged with compiling EPM data and information at the business unit and corporate levels.

Measurement activity may also be coordinated according to core operational controls and environmental impact categories. Measurement representatives and teams of measurement representatives may be established as resident experts on certain impacts. Furthermore, there may be a team of lead representatives for advising on and facilitating the implementation of operational controls. These representatives would serve as filter points for compiling and communicating EPM data and information. Such measurement teams would typically be cross-functional. The need for such teams would depend on the extent of application of operational and emergency control throughout the energy utility (i.e. the number of business areas implementing controls), the severity of impacts being managed, the extent and intensity of associated measurement activities, and/or the number of different business areas having common objectives and measurement activities related to the impact. An example of this is measurement for operational control related to hazardous waste. There could be a team of hazardous waste coordinators within the business units responsible for maintaining liaison with management and personnel responsible for the implementation of hazardous waste control. This team would report to a corporate level expert who is responsible for the maintenance of control documentation, analysis of EPM data and information, and recommending action on performance information.

1.6 What are the Enablers for Data Collection and Communication?

There are physical and process enablers for data collection in an energy utility. Physical enablers will vary according to measurement needs, complexity and intensity. BP requires the collection, communication, and analysis of EPM data and information. Hence, the BP processes could also be seen as enablers for EPM data collection and communication related to environmental objectives, targets and programs. EPM data and information would filter to key representatives responsible for analysis. These representatives would serve as information suppliers to the BP processes. These processes are also a vehicle for assessing and applying measurement information.

Data collection and communication enablers could be seen as the tools used to collect, store and provide access to measurement data and information. Databases and spreadsheets are a useful means of gathering and providing access to vast amounts of data. Paper records such as inspection reports and status reports are another means. Checklists and self-assessment recording processes are useful for collecting data on EM controls and regulatory compliance. Surveys are used for perception measurement.

For those activities that do not lend themselves to quantitative measurement data, observation and communication (verbal or written) of tacit knowledge may be the most effective means of gathering and communicating measurement data and information.

1.7 How Will EPM Data and Information be Analyzed?

Performance analysis is a synthesis of past, present and desired future states. It involves the evaluation of achieved performance against performance criteria. Once measurement data has been collected, it should be analyzed to convert it into useful information to be assessed and applied in decision making. As a result, there should be certain filter points for the analysis of measurement data. For department environmental objectives, targets, and programs, some form of EPM data analysis should be performed or delegated by the Department Manager. The same applies to the Division Manager for divisional environmental objectives, targets and programs.

For business unit environmental objectives, targets and programs, there should be a filter point for the flow of data and communication of information. Let us call this filter point the EPC. The Business Unit EPC would be charged with compiling and, in certain cases, analyzing data and information on business unit environmental objectives, targets and programs for the purposes of EM planning and review. This role would also be responsible for gathering updates on pertinent division level environmental objectives, targets and programs as a basis for business unit level EPM information. At the corporate level, there should be a parallel role charged with compiling data and information on corporate environmental objectives, targets and programs.

For regulatory compliance, how data is analyzed depends on legislation. For operational controls built around environmental legislation, performance analysis should be conducted by the personnel responsible for the maintenance of operational controls. Analysis for EM controls may revolve around self-assessment reporting and consultation with control users and business unit level control leads or delegates. For licensable environmental statutes, such as the Water Power Act, analysis of data should be undertaken or directed by the Department or Division Manager ultimately accountable for compliance performance under the license and the maintenance of the license.

There may be situations where certain business areas are responsible for control implementation and outcome, while another is responsible for developing, maintaining and disseminating control requirements. In such cases, analysis and application of measurement data and information can occur at the implementation level, as well as at the maintenance level.

1.8 How is EPM information to be applied and who is responsible?

Getting the information to the people who can use it requires strong lines of communication and internal awareness of the relations between physical measurement, data collection and communication, EPM data analysis, and the rationale for measurement. Those who physically measure, compile and communicate performance data should be aware of those who analyze and apply the data and vice-versa. The assessment and application of EPM information is typically a management function. EPM information assessment refers to the action of determining what EPM information is telling management so that such information can become meaningful in decision making.

Improvement action is based on performance assessment. This implies that assessment and application of measurement information occurs at a level where action decisions can be made. An effective result-based EPM network should have enablers in place for the assessment and application of

performance. These enablers may include regular performance reviews for business plans, EMS reviews, management communication meetings, business area communication meetings, safety performance reviews, spill and release investigations, inspection reviews, reviews of operational or emergency controls, reviews of self-assessments related to controls or regulatory compliance, reviews related to external performance reporting, and EM program or project specific meetings.

Several of the above listed enablers are communication forums, and this reflects the fact that the application of EPM data and information may require expertise and input from a collaboration of various sources within an energy utility. These enablers should function to deliver value in terms of early detection of problem areas, identification of improvement opportunities, and the development of necessary corrective and preventative actions.

The application of measurement information is a vehicle for change and improvement. This application involves the transformation of EPM data and information into information that can be used to make decisions on future direction. The processes of assessing and applying measurement information should involve personnel that possess the knowledge capital to analyze measurement data, identify root causes, and determine the necessary solutions to causes of variation. Furthermore, it should involve personnel with the authority to delegate corrective and other actions. This may involve one employee or several.

1.9 How is the EPM network communicated and structured?

Based on the above considerations and case specific alternatives, the EPM network is structured and communicated. Note that this consideration has not been included in Figure B1 because there are a number of different applicable and complex alternatives for this consideration that require discussion.

In an energy utility, the result-based EPM network is complex and widely encompassing. What constitutes a clear or transparent result-based EPM system is a matter of interpretation. What works to communicate the EPM network within a company may vary by function and business area. The intent of defining a clear EPM network is not to induce more paperwork into an organization. The intent is to have everyone working on the same page. Extensive paperwork defining all of the above items is ineffective because such documentation must be frequently updated as roles change and measurement activities evolve. Furthermore, such documentation would be of use to a limited number of employees with measurement responsibilities who would have little use for it once relevant network items are known.

How the EPM network is communicated should consider what means exist to convey such information. What is required is the effective and efficient communication of the EPM network interfaces and processes to those employees with EPM responsibilities. Network structure refers to the internal lines of communication through which result-based EPM data, information and action flow. In an energy utility, EPM processes flow through the EPM network structure. Some possible means of defining and communicating the network based on research within the case utility are described in Table B2. An analysis of the relative advantages and disadvantages of each is also presented in Table B2.

Any means of communicating a result-based EPM network in a large corporation will have relative advantages and drawbacks. To optimize communication of the EPM network, it is suggested that a combination of different means be used. First, as employees and new personnel move into positions with EPM responsibilities, training should include direction on the appropriate contacts and interfaces for assigned measurement activities.

A team of resident experts should be established as lead representatives for certain core measurement activities. Certain measurement activities will be fundamental to more than one business unit. Because such measurement activities involve actions and measurement responsibilities that cross functional boundaries, the dissemination of measurement data and information should flow through lead representatives or experts who perform data compiling, data analyzing, and advising functions. An example

of this is greenhouse gas emission measurement, which can stem from gas distribution leaks within a transmission and distribution business unit and from thermal generation facilities within a generation business unit. Depending on the measurement activity, a team of lead representatives could be centrally located within one business unit or there could be individual leads within each of the relevant business units reporting to a centrally located or corporate level measurement team leader.

Table B2: Possible Means of Defining and Communicating the Result-Based EPM Network in an Energy Utility

Possible Means of Defining and Communicating the Result-Based EPM Network	*Advantages*	*Disadvantages*
Documented network defining certain items described and captured in the form of a database or spreadsheet	- Can clearly define the items - Provides clear direction to measurement personnel - Easily updated and adaptable to new or changing measurement activities - Could be a good tool for awareness and direction	- Intensive maintenance requirements and extensive documentation - Updating requires strong lines of cross-functional communication - May be of limited use once key measurement personnel is aware of the items (i.e. may only be useful in the short term)
Implemented as part of relevant employee training	- Can clearly convey and explain the items - Ensures that the key measurement personnel are aware of the items - May strengthen internal communication (i.e. face-to-face contact rather than a name on a document)	- May require extensive resources to modify existing training programs - Extensive duplication effort as turnover and training requirements grow
No documented network – Measurement responsibilities and activities defined through business plans and program plans	- Can clearly convey the items - Business plan reviews provide a vehicle for updating and improvement - Can provide strong definition of the linkages between measures, associated programs, objectives and targets, and the lead responsibilities	- Requires consistent BP processes across the Corporation, which may not be feasible - Not all program plans will get documented, leading to a lack of paper trail or objective evidence of EPM
Personnel assigned as lead representatives and resident experts on specific measurement activities with responsibilities defined through documented list	- Provides for the application of expertise of lead representatives in EPM - Facilitates the development of internal lines of communication - Easily updated - Resident experts are a good means of keeping the Corporation abreast of changing regulations and issues surrounding measurement activities	- May miss links to program measurement activities - Relies on the knowledge of limited number of key personnel - May lead to bottlenecking as measurement information filters through a limited number of key personnel

There may also be certain priority environmental objectives, programs and measurement activities for a specific business unit. The measurement activities for the priority environmental objectives and programs may cross functional boundaries within the business unit and should also have a lead representative for data compilation, analysis and communication. Lead measurement experts or representatives for core and priority measurement activities should report to an EPC and, as applicable, to any associated corporate level or centrally located measurement leaders.

The EPC role would be established as an overseer and champion for environmental performance within their business area. Assuming an organizational structure for a fully-integrated energy utility, BP processes should drive the setting EMS related objective, target and programs. Ideally, business unit environmental objectives, targets and programs will cascade down to divisional environmental objectives, targets and programs, which will then cascade down further to departmental environmental objectives, targets, strategic actions and programs. The EPC would maintain awareness of the business unit and division level environmental objectives, targets, measurement activities, programs, and related performance. As discussed, this role would compile EPM data and information for business unit environmental objectives, programs and targets. This includes gathering updates on strategic actions and programs delegated to the divisional level and significant to the business unit level.

EPCs could be facilitated with a documented list describing the measurement network for which they oversee. The documented list could include the name of the measurement activity and the lead responsibility, identification of the level and business area for which measurement is taking place, a description of what is being measured and the measures being used, a description of the performance criteria, and identification of the source of measurement data. Updating the documented list of measurement activities would be the responsibility of the EPC. Ideally, this role should be aligned with that of the Business Unit EMS Coordinator, who also has a responsibility to maintain awareness on EMS related performance and issues. Note that the role of EMS Coordinator stems from the ISO 14001 standard, whereas the role of EPC comes from the case utility.

The core and priority measurement activities, for which lead representatives or resident experts would be established and for which the EPCs would oversee, should stem from business unit level objectives and targets. Any divisional objectives, programs and strategic actions that are significant to or affect the business unit environmental performance should have a linkage to the EPC. Therefore, this role would operate at a divisional level and would have direct communication lines with the divisional managers in addition to lead measurement representatives for core and priority measurement activities.

At division and department levels, organizational structure can define the result-based EPM network. In other words, the Department Manager reports to a Division Manager, who, in turn, reports to a Business Unit Vice-President and informs the Business Unit EPC. PM, analysis and application should follow a bottom-up structure.

Department level programs and local improvement initiatives can be defined and communicated through BP and program planning processes. Business plans should reference programs, performance measures and overall accountability. Program plans should be more detailed and should define program scope, deliverables, schedule, budget, responsibilities, performance measures, PM activities, and performance criteria. The documentation of program plans depends on the need for rigorous planning. This is left to the discretion of the business area implementing said program. If a program involves the establishment of a working group or a committee, then the plan should definitely be documented because working teams require clear direction. If a program is undertaken by a limited number of employees, measurement is not cost effective, and performance is defined only in terms of outcome or qualitative information, then program plans may not need to be documented and qualitative feedback on program performance would be collected, analyzed and applied.

Based on the above discussion, one can propose certain core EPM network structures and processes applicable to an energy utility. Figure B2 illustrates the proposed result-based EPM network structure for environmental objective, target and program measurement within an energy utility.

Using a BP process as the driver for setting environmental objectives, targets and programs, the associated result-based EPM process should be an annual cyclical process. An annual basis allows for quarterly reviews. Quarterly reviews allow for meaningful feedback of EPM information and can coincide with regulated accounting cycles in an energy utility (i.e. publicly owned utilities are required to disclose quarterly financial statements). The process should begin with the setting of corporate level environmental objectives, targets and programs because EMS related strategy and direction should follow a top-down flow. There should be a cascading effect that ties EM actions with the goals and objectives set by corporate level management. Figure B3 illustrates the proposed process for the result-based EPM of environmental programs, objectives and targets.

Figure B4 illustrates the proposed EPM network structure for environment and/or safety related operational, emergency and regulatory compliance control measurement. For core environment and safety management controls, measurement and maintenance activities should be directed and filtered through a dedicated occupational health and safety business area with designees throughout the business units. For non-core EM controls (i.e. localized operational, emergency, and/or compliance controls), PM data and information should originate from the functional business area responsible for control outcome and implementation. Appropriate measurement data and information should then filter to the business area responsible for the development and maintenance of the control for the purposes of control review and improvement.

For regulatory compliance, operational control, emergency control and other requirements, the proposed result-based EPM process is a cyclical process illustrated in Figure B5. Safety management and environmental management in an energy utility have considerable overlap. Certain safety and health related operational controls are also environmental operational controls. EM controls are measured for performance through assessment of their implementation and through measurement of outcomes affected by controls. There may be situations where certain business areas are responsible for control implementation and outcome, while another is responsible for developing, maintaining and disseminating control requirements. In such cases, application of measurement data and information can occur at the implementation level, as well as at the maintenance level.

Figures B2 and B4 are based partially on the network structures uncovered in the case utility and partially on the author's conceptualization of "idealized" EPM network structures. Figures B3 and B5 are partially based on the processes uncovered in the case utility and on what the author has conceptualized to be "idealized" process flow. The applicability of Figures B2, B3, B4, and B5 to the case utility will be discussed further in Chapter 5 and Appendix H.

Figure B2: Structure for Result-Based EPM for Environmental Objectives, Targets and Programs in an Energy Utility

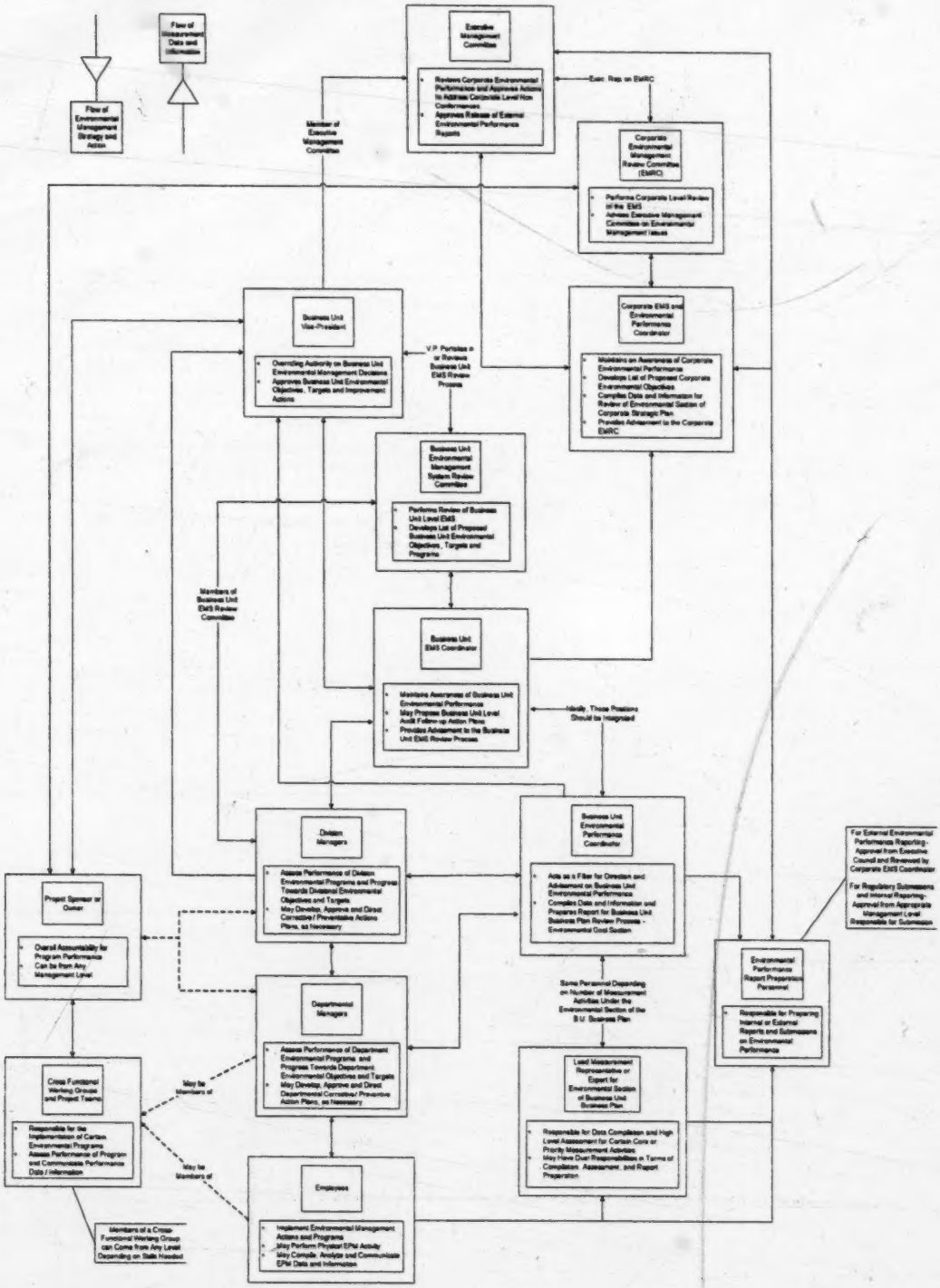

Flow of Environmental Management Strategy and Action
Flow of Measurement Data and Information
Executive Management Committee
Reviews Corporate Environmental Performance and Approves Actions to Address Corporate Level Non Conformances
Approves Release of External Environmental Performance Reports
Exec. Rep. on EMRC
Member of Executive Management Committee
Corporate Environmental Management Review Committee (EMRC)
Performs Corporate Level Review of the EMS
Advises Executive Management Committee on Environmental Management Issues
Business Unit Vice-President
Overriding Authority on Business Unit Environmental Management Decisions
Approves Business Unit Environmental Objectives, Targets and Improvement Actions
V.P. Partakes in or Reviews Business Unit EMS Review Process
Corporate EMS and Environmental Performance Coordinator
Monitors on Awareness of Corporate Environmental Performance
Develops List of Proposed Corporate Environmental Objectives
Compiles Data and Information for Review of Environmental Section of Corporate Strategic Plan
Provides Advisement to the Corporate EMRC
Business Unit Environmental Management System Review Committee
Performs Review of Business Unit Level EMS
Develops List of Proposed Business Unit Environmental Objectives, Targets and Programs
Members of Business Unit EMS Review Committee
Business Unit EMS Coordinator
Monitors Awareness of Business Unit Environmental Performance
May Propose Business Unit Level Audit Follow-up Action Plans
Provides Advisement to the Business Unit EMS Review Process
Modify, Those Positions Should be Integrated
Division Managers
Assess Performance of Division Environmental Programs and Progress Towards Divisional Environmental Objectives and Targets
May Develop, Approve and Direct Corrective / Preventative Actions Plans, as Necessary
Business Unit Environmental Performance Coordinator
Acts as a Filter for Direction and Advisement on Business Unit Environmental Performance
Compiles Data and Information and Prepares Report for Business Unit Business Plan Review Process - Environmental Cost Section
For External Environmental Performance Reporting - Approval from Executive Council and Reviewed by Corporate EMS Coordinator
For Regulatory Submissions and Internal Reporting - Approval from Appropriate Management Level Responsible for Submission
Project Sponsor or Owner
Overall Accountability for Program Performance
Can be from Any Management Level
Departmental Managers
Assess Performance of Department Environmental Programs and Progress Towards Department Environmental Objectives and Targets
May Develop, Approve and Direct Departmental Corrective/ Preventative Action Plans, as Necessary
Some Personnel Depending on Number of Measurement Activities Under the Environmental Section of the B.U. Business Plan
Environmental Performance Report Preparation Personnel
Responsible for Preparing Internal or External Reports and Submissions on Environmental Performance
Cross Functional Working Groups and Project Teams
Responsible for the Implementation of Certain Environmental Programs
Assess Performance of Program and Communicate Performance Data / Information
May be Members of
Lead Measurement Representative or Expert for Environmental Section of Business Unit Business Plan
Responsible for Data Compilation and High Level Assessment for Certain Core or Priority Measurement Activities
May Have Over Responsibilities in Terms of Compilation, Assessment, and Report Preparation
Employees
Implement Environmental Management Actions and Programs
May Perform Physical EPM Activity
May Compile, Analyze and Communicate EPM Data and Information
Members of a Cross-Functional Working Group can Come from Any Level Depending on Skills Needed

Figure B3: Result-Based EPM Process for Environmental Objectives, Targets and Programs in an Energy Utility

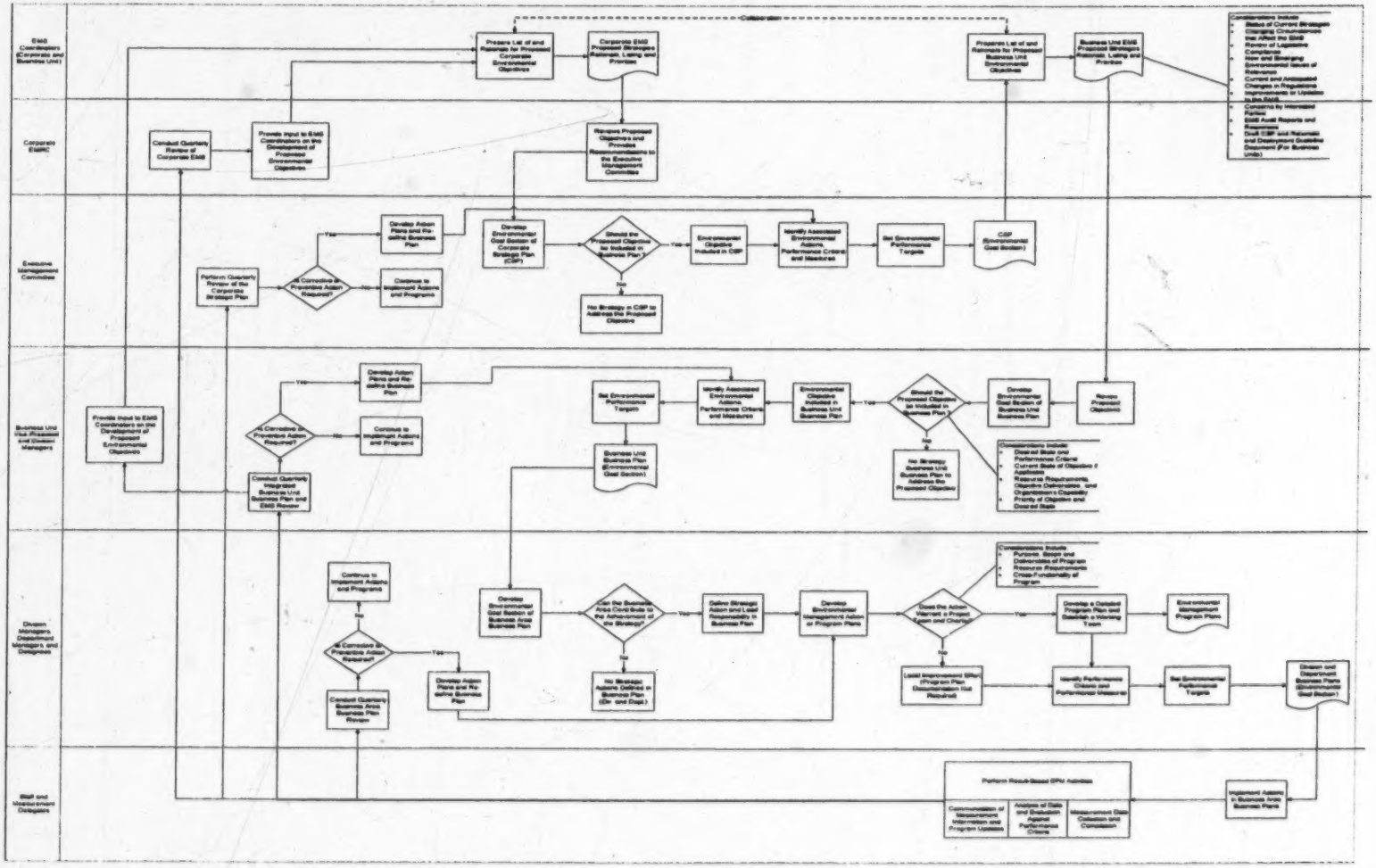


Figure B4: Structure for Result-Based EPM for Environment and Safety Regulatory Compliance, Operational and Emergency Controls in an Energy Utility

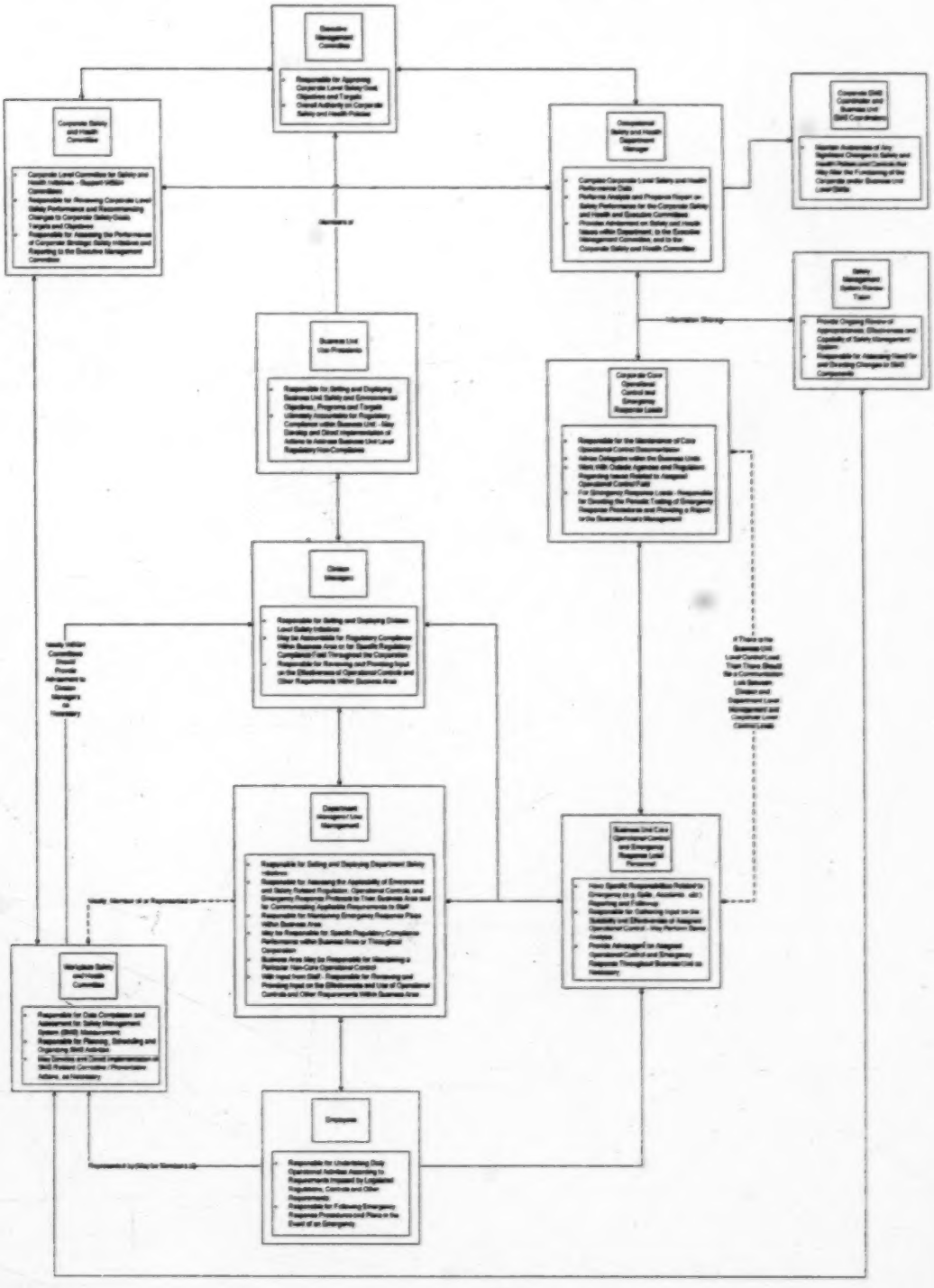
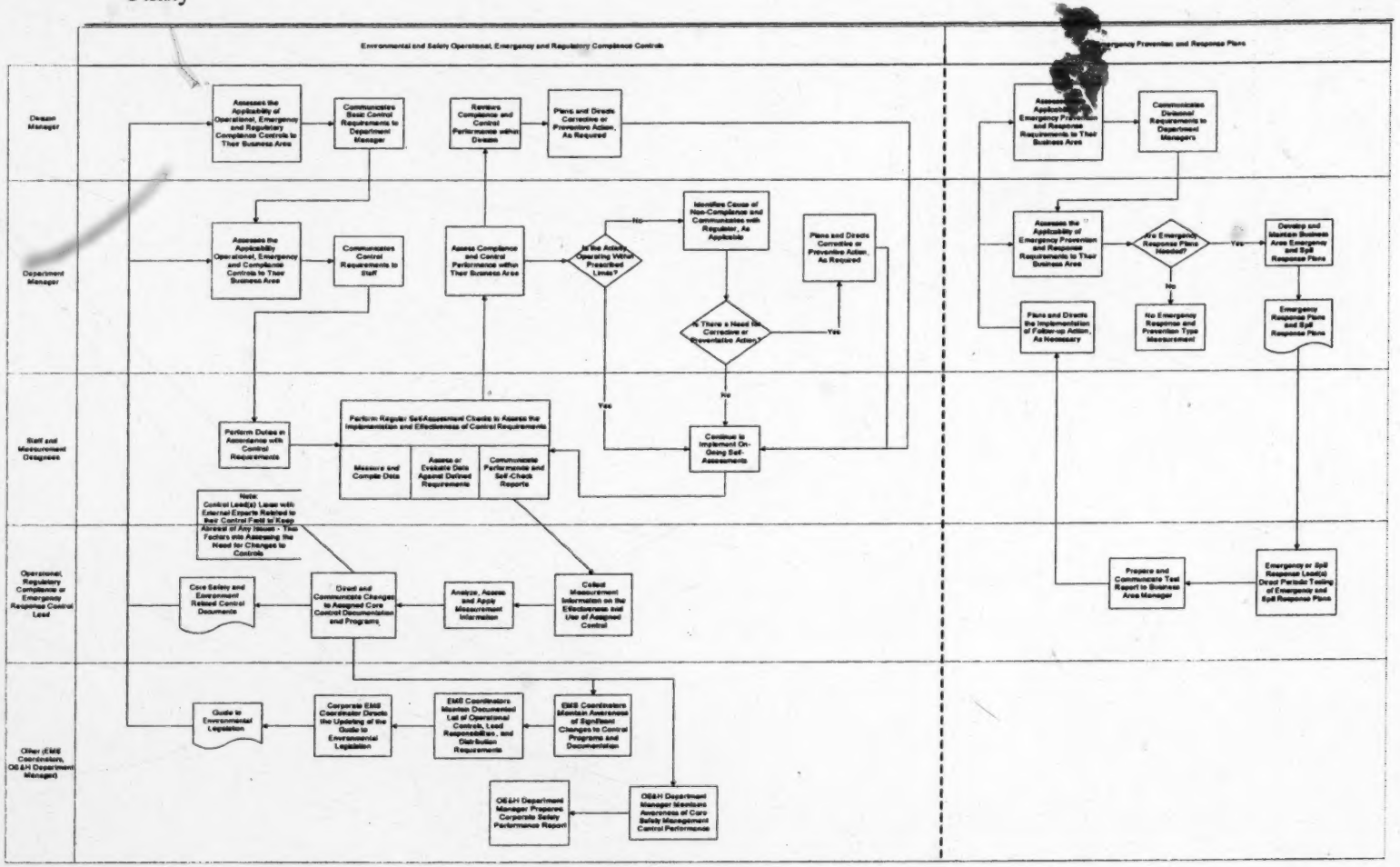


Figure B5: Result-Based EPM Process for Environmental Regulatory Compliance, Operational and Emergency Control in an Energy Utility


Environmental and Safety Operational, Emergency and Regulatory Compliance Controls
Emergency Prevention and Response Plans
Division Manager
Department Manager
Staff and Measurement Designees
Operational, Regulatory Compliance or Emergency Response Control Lead
Other (EMS Coordinators, OE&H Department Manager)
Assesses the Applicability of Operational, Emergency and Regulatory Compliance Controls to Their Business Area
Communicates Basic Control Requirements to Department Manager
Reviews Compliance and Control Performance within Division
Plans and Directs Corrective or Preventive Action, As Required
Assesses the Applicability Operational, Emergency and Compliance Controls to Their Business Area
Communicates Control Requirements to Staff
Assess Compliance and Control Performance within Their Business Area
Is the Activity Operating Within Prescribed Limits?
No
Yes
Identifies Cause of Non-Compliance and Communicates with Regulator, As Applicable
Plans and Directs Corrective or Preventive Action, As Required
Is There a Need for Corrective or Preventative Action?
Yes
No
Perform Duties in Accordance with Control Requirements
Perform Regular Self-Assessment Checks to Assess the Implementation and Effectiveness of Control Requirements
Measure and Compile Data
Assess or Evaluate Data Against Defined Requirements
Communicate Performance and Self-Check Reports
Continue to Implement On-Going Self-Assessments
Note: Control Lead(s) Liaise with External Experts Retained to their Control Field(s) to Keep Abreast of Any Issues - This Factors into Assessing the Need for Changes to Controls
Core Safety and Environment Related Control Documents
Direct and Communicate Changes to Assigned Core Control Documentation and Programs
Analyze, Assess and Apply Measurement Information
Collect Measurement Information on the Effectiveness and Use of Assigned Control
Guide to Environmental Legislation
Corporate EMS Coordinator Directs the Updating of the Guide to Environmental Legislation
EMS Coordinators Maintain Documented List of Operational Controls, Lead Responsibilities, and Distribution Requirements
EMS Coordinators Maintain Awareness of Significant Changes to Control Programs and Documentation
OE&H Department Manager Prepares Corporate Safety Performance Report
OE&H Department Manager Maintains Awareness of Core Safety Management Control Performance
Assesses the Applicability of Emergency Prevention and Response Requirements to Their Business Area
Communicates Divisional Requirements to Department Managers
Assesses the Applicability of Emergency Prevention and Response Requirements to Their Business Area
Are Emergency Response Plans Needed?
Yes
No
Develop and Maintain Business Area Emergency and Spill Response Plans
Plans and Directs the Implementation of Follow-up Action, As Necessary
No Emergency Response and Prevention Type Measurement
Emergency Response Plans and Spill Response Plans
Prepare and Communicate Test Report to Business Area Manager
Emergency or Spill Response Lead(s) Direct Periodic Testing of Emergency and Spill Response Plans

2.0 Discussion on EMS Audit Program Organizational Structure

Given that all major electric utilities in Canada have EMSs conforming to the ISO 14001 standard, the focus of this section is ISO 14001 EMS auditing. Depending on interpretation of ISO 14001, an EMS in an energy utility can be set up in different ways. There could be several EMSs in an energy utility based on the assumed organizational structure for fully-integrated energy utilities. An EMS may be set up as an umbrella system with a corporate level EMS and business unit EMSs. It may also be set up as one overall EMS covering all substantive and system elements throughout the entire corporation. It is assumed that the energy utility in question would have a single corporate level EMS registration, as this would be more cost effective than having multiple individual facility level and business unit EMS registrations. The corporate level EMS would be an umbrella system covering corporate level and core system elements. At a business unit level, the EMS would extend to cover business unit specific elements. There would be a corporate EMS manual supported by business unit sub-modules. Additionally, there would be Corporate and Business Unit EMS Coordinators.

The EMS audit element of the ISO 14001 standard leaves much to interpretation. It is not prescriptive and conveys little in terms of how to go about auditing. The standard simply requires that an EMS auditing program be established to check conformance to the standard and planned EM arrangements and to check the proper planning, implementation, operation and maintenance of the EMS throughout the company. ISO 14001 does not describe how auditing should be structured, planned, executed, followed-up, or reported.

The ISO 19011 Guidelines provide some further detail into the fundamental processes needed to prepare, conduct, report and follow-up EMS audits. ISO 19011 is broad enough so that it is applicable to any organization implementing a QMS or EMS. It focuses little on the determination of audit scope, criteria and coverage, and it does not provide much distinction betweein internal EMS auditing, surveillance auditing, and third party EMS registration auditing. Therefore, ISO 19011 lacks case specific detail and must be tailored to the organization seeking to develop a value-adding internal EMS audit program.

Once a company has been registered to ISO 14001, surveillance audits are conducted by third-party registrars at least once per year to verify that the company's EMS continues to function to meet the requirements of the standard. To maintain registration, third-party registrars conduct registration audits every three years. In addition to the surveillance and registration audits, ISO 14001 requires that the organization implementing the standard "ensure that internal environmental management system audits are conducted at planned intervals" (ISO/DIS 14001, 2003). This EMS auditing can be executed by a functional business area within the company dedicated to internal auditing or by an external party. In an energy utility, the tendency would be more towards the former because most already have competent internal auditing departments (IADs) due to the need for other auditing functions beyond internal EMS audits. It is assumed that an energy utility would have a functional department devoted to internal auditing. Within this department, there would be a Lead Internal EMS Auditor.

To maintain impartiality, an IAD should operate at a corporate level, independent of the business units, functions and systems being audited. In the context of EMS auditing, the internal auditing department would act as an extension of corporate management in order to provide an objective assessment of the implementation and effectiveness of the organization's EMS(s) as a basis for action. Hence, clients of an internal EMS audit would include the Corporation's President, Vice-Presidents and the Audit Committee of the Board of Directors. A corporate level internal management review committee should be established to facilitate internal audit planning, review and follow-up activities. Let us call this committee the Internal Audit Review Committee (IARC). The IARC would be a corporate level committee comprising the President and executive representation from each business unit. Essentially, the IARC would comprise the same membership as the Executive Management Committee, but it would have the distinct agenda of reviewing audit plans and reports, providing input or feedback, and, in certain situations, planning and directing follow-up action. The Board of Directors for an energy utility provides the highest level of direction, as required. The Board of Directors is typically appointed to represent the stakeholders or shareholders of the energy utility and to administer company affairs, as required.

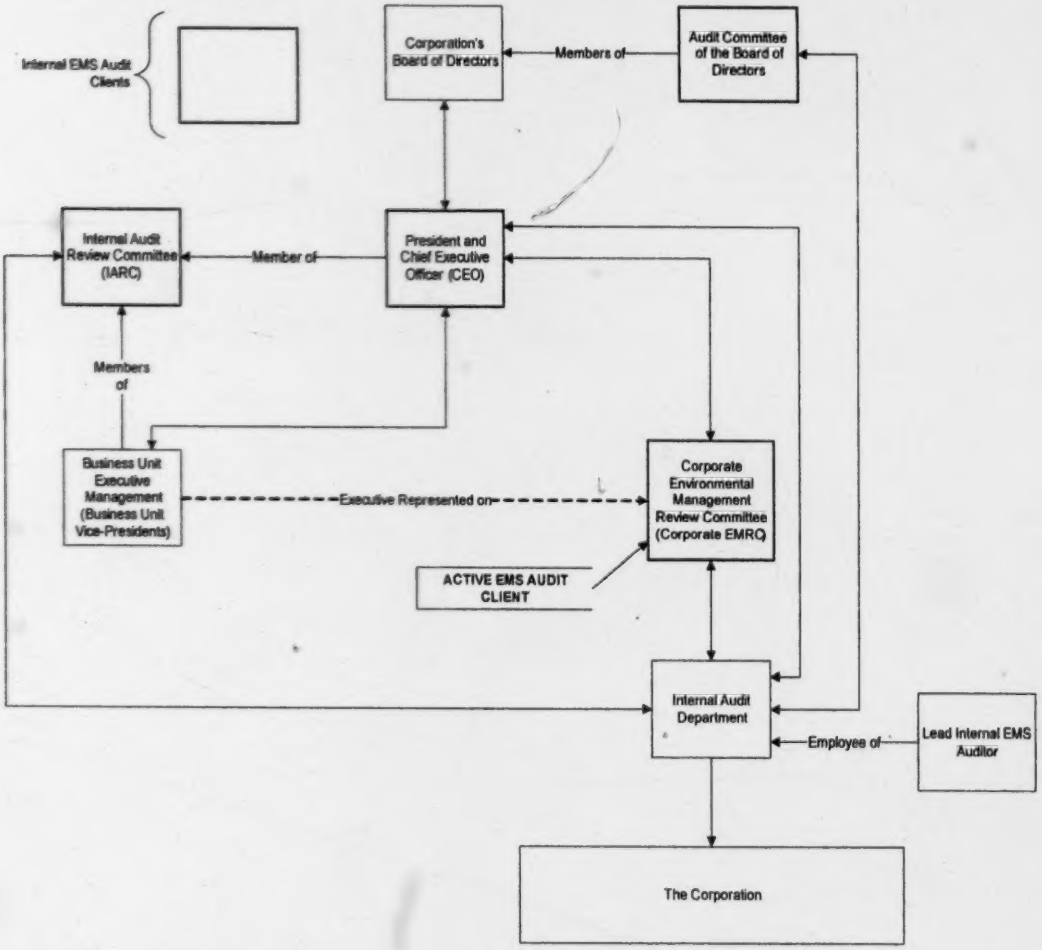
For internal or external EMS audits, an energy utility would have another important audit client. Although the ultimate responsibility for EM in an energy utility would fall under the President, advisement for EM decision making at a corporate level will typically be supplied to the President. Approval decisions may come from the President or Board of Directors, but advisement on EMS decision making should be delegated to a corporate EMS review committee responsible for regularly reviewing the suitability, adequacy and effectiveness of the corporate level EMS. This corporate EMS review committee would have links to executive management and would include the Corporate EMS Coordinator as a member and information provider. Let us call this committee the Corporate Environmental Management Review Committee (Corporate EMRC). For an EMS audit, the Corporate EMRC acts as a client.

The audit client typically provides input and direction in terms of desired audit program objectives, criteria and scope, and the risks or priority areas and issues to be covered within an audit program. In an internal EMS audit, the IAD would develop the audit program plans with consideration given to client specified parameters. If the management review of the corporate level EMS and corporate level EM advisement are accomplished through the Corporate EMRC, it stands to reason that this committee should have a stronger understanding of the risks and issues within the scope of the EMS(s) than the IARC, President or Board of Directors. Consequently, EMS auditing parameters should be provided by the Corporate EMRC. Furthermore, the Corporate EMRC should make recommendations on corporate level follow-up actions stemming from EMS audit findings and recommendations. It stands to reason that the Corporate EMRC serves as the acting client, whereas the IARC, President and Board of Directors serve more as non-active clients with a vested interest in the auditing plans and outcomes.

In addition to being a client, the Corporate EMRC could be audited to assess the corporate level EMS management review process. This means that in an energy utility, the Corporate EMRC can function as both a client and auditee in internal or external EMS audit.

Figure B6 illustrates the suggested structure for internal EMS auditing in an energy utility.

Figure B6: Proposed Organizational Structure for Internal EMS Auditing Function in an Energy Utility


Internal EMS Audit Clients
Corporation's Board of Directors
Members of
Audit Committee of the Board of Directors
Internal Audit Review Committee (IARC)
Member of
President and Chief Executive Officer (CEO)
Members of
Business Unit Executive Management (Business Unit Vice-Presidents)
Executive Represented on
Corporate Environmental Management Review Committee (Corporate EMRC)
ACTIVE EMS AUDIT CLIENT
Internal Audit Department
Employee of
Lead Internal EMS Auditor
The Corporation

3.0 Discussion on Internal EMS Audit Process Sequence and Practices

3.1 Audit Planning

Arguably the most important component of an EMS audit is the preparation stage. To provide value, internal and external EMS audits require extensive planning based on environmental risk perception and priorities within the company being audited, EMS related criteria, and EMS documentation. The fundamental difference between internal and external EMS auditing is depth of coverage. Both are based on sampling and both are executed, reported and followed-up in similar manners. Nevertheless, an external registration or surveillance audit for an ISO 14001 EMS should assess all elements of the standard within a wide scope of the corporation. Essentially, these external EMS audits should have broad coverage, broad scope, and shallow depth of coverage. The concept behind an internal EMS audit is to drill down further within a series of narrower scopes covering parts of the EMS at a time. With a series of partial or micro-internal EMS audits forming the whole of the internal EMS audit program, the sum of the parts should provide the scope and coverage to adequately represent the full functioning of the EMS(s) within the company being audited. An internal EMS audit program should provide broad coverage, broad scope and considerable depth of coverage.

Internal EMS audit planning involves the development of long-term and short-term audit plans. A short-term internal EMS audit plan, herein referred to as an internal EMS audit plan, refers to a detailed annual audit plan that contributes to the accomplishment of the long-term plan. The long-term audit plan, herein referred to as the audit program plan, refers to a high-level audit plan that requires a series of individual internal EMS audits to fulfill the program objectives. The audit program should provide adequate and appropriate scope, depth and coverage of EM within the energy utility to assure that the EMS elements are being properly planned, implemented, maintained and improved. Additionally, there may be a need to identify opportunities for further EM improvement.

There should be a direct linkage between both individual internal EMS audit plans and the overall audit program plan in the sense that the objectives, scope and coverage of an individual internal EMS audit should be contributing to the desired objectives, scope and coverage of the EMS audit program plan. On the other hand, one cannot simply derive the individual internal EMS audit plan from the program plan. An audit program plan is a basis for planning individual audits. Individual audit plans define audit action. Individual internal EMS audit plans are detailed. In addition to audit program parameters, individual internal EMS audits require an assessment of risk to identify the priority areas, personnel, activities, issues, and ISO 14001 elements to be audited.

If individual internal EMS audit plans are developed annually, audit program parameters should also be prepared annually to coincide with audit planning. The audit program plan covers a time-span greater than that of the individual internal EMS audit plans. Program plans should be reviewed and revised annually to reflect any changes to desired program parameters and any contributions to the accomplishment of the program plan through the execution of individual internal EMS audits.

Ideally, risk assessment in a large corporation such as a fully-integrated energy utility should be conducted in a systematic manner. This is no different for internal audits. Identification of priority areas and activities to be audited should be a systematic process undertaken by the Lead Internal EMS Auditor. Risk assessment and planning for the development of an internal EMS audit plan is encompassed in a scope, coverage and criteria determination (SCCD) process. Table B3 presents a broad level SIPOC (Supplier, Input, Process, Output, and Customer) analysis to depict the internal EMS audit SCCD process. Table B3 Part B is a continuation of the table that presents only SI, as POC is consistent with Table B3 Part A. The general inputs to this process will not change. Environmental risks by business area throughout an energy utility will remain relatively constant, but can change with changing operations and processes, stakeholder and public perception, technology and research advancement, regulation, and with expansion and new development. Corporate priority in terms of environmental risk is perpetual. For example, the fact that a department dedicated to apparatus maintenance could potentially cause releases of oil into the environment does not change. On the other hand, if stakeholders and the public expressed concern about oil storage at an apparatus maintenance facility, then the potential to cause such releases could become a high

priority environmental risk. This could then lead to the notion that oil containment and storage operational controls and their use in the field are areas that should be covered in an EMS audit.

The SCCD process for an internal EMS audit is an iterative process that should contribute to continuous improvement of the EMS audit program. The IAD should be providing value to an energy utility by providing audit conclusions and recommendations that form a basis for action. Audit conclusions, recommendations and findings can provide the most value when auditing is prioritized according to environmental risks. The assessment of risk requires input from all levels within an energy utility. EMS audit SCCD is a knowledge sharing activity, so there should be strong communication interfaces between the Lead Internal EMS Auditor, the audit clients and potential auditees. The internal EMS audit program plan and individual EMS audit plans should be reviewed and approved by the audit clients. The Corporate EMRC, the IARC, and the Audit Committee of the Board of Directors should all review draft audit program plans and annual internal EMS audit plans prepared by the Lead Internal EMS Auditor. Feedback should be provided, and the plans should be revised accordingly. Final approval on both types of plans should come from the President once feedback from all clients has been considered.

The individual internal EMS audit plan should describe audit objectives, criteria, scope, timing and location, roles and responsibilities, resource allocation, identification of auditees or personnel to be audited, audit reporting fundamentals (i.e. topics, format, structure, expected dates for issue, language…etc.), and confidentiality issues.

Under the ISO 19011 sequence for management system audit activities, conducting document review proceeds the definition of audit objectives, scope and criteria; however, a review of EMS documentation within the company being audited should factor into the audit SCCD process.

The value-adding potential of an EMS audit depends on the scope, coverage and criteria defined through audit planning. Internal EMS audits require criteria against which to assess systemic performance, and such criteria cannot be derived entirely from the ISO 14001 standard. Once an energy utility has been registered to ISO 14001, audit criteria should be partially derived from sources within the company. To improve an audit program, one must either improve the audit methodology or the audit criteria. By integrating result-based EPM into internal EMS auditing, the planning process can be improved, leading to improvement of the audit sample.

Table B3: Part A: SIPOC Analysis of Internal EMS Audit Plan SCCD Process

Supplier	Input	Process	Output	Customer
- IAD and External Auditors	- Previous Audit Findings, Recommendations, Corrective Action Plans, and Follow-up Reports	Lead Internal EMS Auditor Reviews Inputs Annually for the Development or Revision of the Audit Program Plan. Based on Inputs, the Lead Internal EMS Auditor Develops the Long-Term Internal EMS Audit Program Plan Lead Internal EMS Auditor Reviews Inputs Prior to Developing the Annual Internal EMS Audit Plan. Based on Inputs, the Lead Internal EMS Auditor Develops the Annual EMS Audit Plan	Long-Term Internal EMS Audit Program Plan Annual Internal EMS Audit Plan	Internal EMS Audit Clients (President and Board of Directors, Internal Audit Review Committee, Corporate EMRC) IAD Auditees Identified through Internal EMS Audit SCCD Process
- IAD	- Internal EMS Audit Program Plan			
- International Organization for Standardization (ISO)	- ISO 14001 Environmental Management Systems – Requirements with Guidance for Use			
- ISO	- ISO 19011 – Guidelines for Quality and/or Environmental Management Systems Auditing			
- Corporate EMS Coordinator	- Corporate Strategic Plan - Rationale, Listing and Priorities for Corporate Level Environmental Objectives and Targets			
- Business Unit EMS Review Committee (i.e. Business Unit EMS Coordinator and Divisional Managers)	- Business Unit Business Plans – Rationale, Listing and Priorities for Business Unit Level Environmental Objectives and Targets			
- Divisional and Departmental Management	- Divisional and Departmental Business Plans, Environmental Program Plans, and Organization Charts			
- Divisional Management	- Risk Management Profiles – Corporate, Business Unit, and Division Levels			
- Divisional and Departmental Management	- Formal Communication with Certain Division and Department Managers			

Table B3: Part B: SIPOC Analysis of Internal EMS Audit Plan SCCD Process

Supplier	Input
- Key EPM Personnel	- Formal Communication with Key EPM Personnel (e.g. OS&H Department Manager, Operational Control Lead Personnel, Environmental Performance Coordinators…etc.)
- EMS Coordinators	- Formal Communication with EMS Coordinators
- EMS Coordinators	- EMS Documentation Review (e.g. EMS Manuals, EMS Review Meeting Minutes…)
- OS&H Department Manager	- SMS Documentation (e.g. SMS Manuals, Corporate Safety and Health Committee Meeting Minutes, Inspection Reports…)
- Environmental, Health and Safety Legislation Resident Experts and Key Representatives	- Developments Related to Relevant Environmental and Safety Legislation Through Liaison with Internal Representatives
- Conferences and Other Communication Forums	- Liaison with Utility Industry EMS Auditing Experts
- External EMS Auditing Consultants	- Formal Consultation from External EMS Auditing Consultants
- IAD	- IAD Business Plan and Schedule
- Corporate EMRC	- Input from the Corporate EMRC – Internal EMS Audit Program Parameters
- IARC	- Input from the Internal Audit Review Committee (Executive Committee)

3.2 Audit Execution

In conducting a system based audit, the fundamental process is consistent regardless of the type of system being audited (e.g. EMS, SMS, or Quality Management System). Audit execution can occur once an audit plan has been established, a team has been established and assigned work to implement said plan, and work documents have been prepared to facilitate the team in conducting the audit. Depending on the resource requirement to fulfill an individual internal EMS audit plan, an audit team may be established comprising the Lead Internal EMS Auditor, other auditors, and internal experts related to what is being covered in the audit. In an energy utility, the Lead Internal EMS Auditor does not necessarily need to be an environmental professional trained in auditing methodology. The reason for this is that an energy utility will have several internal experts on specific fields that can facilitate the Lead Internal EMS Auditor and partake in the audit execution if audit coverage elements are beyond the scope of the auditor's knowledge.

Audit execution encompasses an opening meeting for a final review of the audit plans, regular communication throughout the audit between the audit team, client representation and auditees, the collection and verification of information to obtain audit evidence, the evaluation of audit evidence against audit criteria to obtain audit findings, a review of audit findings against audit objectives to produce audit conclusions and recommendations, and a closing meeting.

The opening meeting is intended for the review and confirmation of the audit plan, communication channels, and how the work will be carried out. For an internal EMS audit, the opening meeting attendees would include the audit team, the Corporate EMS Coordinator, and, in certain cases, other designees such as guides, specific auditee representatives and specific client representatives. The Corporate EMS Coordinator is essentially the primary client for an internal EMS audit. The responsibility for ensuring that the EMS requirements are established and maintained according to planned arrangements falls under the Corporate EMS Coordinator. It follows that the Corporate EMS Coordinator is also responsible for proposing follow-up action to the Corporate EMRC on corporate level EMS audit findings and recommendations. As an information provider to the Corporate EMRC, the Corporate EMS Coordinator reports directly to the acting client and should serve as the client representative in the opening meeting.

Additionally, the Corporate EMS Coordinator could serve as a representative for the auditees. Because there will be several different auditees within an EMS audit in an energy utility, complete auditee representation at the opening meeting is not feasible. For instance, it is not viable to have fourteen different Division and Department Managers at an opening meeting. A delegate is needed to coordinate and communicate the audit schedule with the various auditees. Given the awareness of the EMS and the communication channels needed for the role of Corporate EMS Coordinator, it stands to reason that this role should serve as the link between the audit plan, the auditors, the audit client, and the auditees.

For any type of audit, the collection and verification of information to obtain audit evidence is accomplished through document review, interviews, observation and tracking. Interview questions can be derived through the audit SCCD process. First, the auditor must determine what needs to be audited and must develop a plan for conducting the audit. In doing so, the auditor reviews what the organization states that it is doing. Based on this review, the auditor seeks to confirm, through the execution phase of the audit, whether or not what is stated is being followed and achieved. Further interview questions and other follow-up questions may arise as a result of audit execution activities related to collecting audit evidence (e.g. prior interviews, observation...etc.).

It is important to note that result-based EPM data and information can be integrated with EMS auditing in the collection of audit evidence. In conducting interviews and reviewing documentation, the Lead Internal EMS Auditor could potentially use result-based EPM related records, self-assessment reports, feedback reports and other related documentation as evidence to demonstrate adherence to controls, compliance to regulatory requirements, or the use of measurement in EMS planning.

Audit findings are generated by evaluating the evidence against the criteria defined in the audit plan. Findings will indicate whether evidence supports conformance or non-conformance to the defined criteria. Findings can also indicate whether evidence supports an opportunity for improvement. Audit

conclusions and recommendations are based on the review of findings. Audit conclusions vary in nature, but typically focus on three main areas including the degree of conformance between the management system and defined criteria, the effectiveness of the implementation and maintenance of the system, and the continuing capability of the system.

The closing meeting provides a forum to wrap-up the audit. It is held for the formal presentation of audit findings, conclusions, and recommendations. For an EMS audit, the meeting should be chaired by the Lead Auditor. Attendees should include the audit team, the Corporate EMS Coordinator, and other designees dependent on the situation and audit findings. The intent of the closing meeting is to ensure that findings, conclusions and recommendations are understood, acknowledged and agreed upon. Accordingly, the closing meeting aims to clear-up any issues or concerns raised by the auditees and audit clients. Recommendations for improvement are not binding, but may lead to actions. Non-conformance findings and conclusions will typically always require some form of action to correct the non-conformance or to further examine the underlying cause in order to identify and implement changes necessary to prevent reoccurrence of the non-conformance.

3.3 Audit Reporting

Audit reporting is the preparation and dissemination of audit information and results in formal written form. Content of the audit report is consistent regardless of the system being audited. For content, refer to ISO 19011 Clause 6.6.1. Format of the audit report can vary based on the auditors and based on the nature of the organization being audited.

For an external EMS registration or surveillance audit, the final audit report is left with the auditee organization and the client following the closing meeting. Corrective action plans are then proposed, reviewed, approved, and submitted by the auditee to the client and the external agency that conducted the audit. In the case of an internal audit, both the client and auditees are within the scope of the Corporation as a whole. Depending on the nature and level of audit findings and conclusions, responsibility for proposing corrective action can vary.

Depending on EMS audit findings, conclusions and recommendations, a Division Manager may have the responsibility to review and provide final approval for follow-up action plans within the scope of their division. Depending on the Division Manager's authority, approval on follow-up action may need to come from the Business Unit Vice-President. For corporate and business unit level follow-up action planning, the EMS Review Committee at the appropriate level may review proposed follow-up actions or recommend follow-up actions. Final approval for follow-up action plans will come from the Business Unit Vice-President for business unit wide actions and from the Executive Management Committee for corporate level actions. It should be noted that an EMS Review Committee (i.e. Corporate and Business Unit level) may not have authoritative power in terms of directing line management and staff. On the other hand, committees make recommendations to those who can act and direct. Therefore, depending on what is needed to accomplish a corporate level corrective action, the Corporate EMRC will make recommendations to the Executive Management Committee, which can provide approval and directive authority.

For an internal EMS audit, a draft report is prepared first to formally communicate the findings, conclusions and recommendations. Corrective action plans are then submitted to the IAD following a proposal, review, and approval process. A final report is then prepared by the Lead Internal EMS Auditor by expanding the original draft to include the agreed upon follow-up action plans and comments from the review of the draft audit report. There should be a timeline for submission of audit follow-up action plans so the final audit report can be distributed on a timely basis.

3.4 Audit Follow-up

Once follow-up action plans are approved, audit follow-up involves the implementation of follow-up action plans and checking or review to assure that follow-up actions are effective and being

implemented according to the established plans. Essentially, audit follow-up involves PM of the responses to audit conclusions and recommendations. Audit conclusions may indicate non-conformances with a need for corrective or preventative actions. Audit recommendations may indicate the need for improvement action. Depending on the follow-up action plans, audit follow-up may involve indicator based measurement or qualitative measurement based on communication from those responsible for implementing the action plans.

Both the personnel accountable for the performance of follow-up action and the Lead Internal EMS Auditor should be conducting PM activities for audit follow-up action. The Lead Internal EMS Auditor is interested in follow-up PM as a basis for planning future EMS audits (e.g. is coverage of follow-up necessary) and to gather information needed to gauge the effectiveness of individual audits and the audit program. The Lead Internal EMS Auditor has no directive authority over management or employees outside of the domain of the IAD. The responsibility for ensuring that follow-up actions are being implemented according to the agreed upon plans applies to management responsible for directing the implementation of the follow-up action. It stands to reason that management accountable for follow-up actions should undertake some form of PM to ensure that follow-up is effective in achieving the desired result and is being implemented accordingly.

Depending on the scope of corrective, preventative or improvement action plans, follow-up PM may not be required. This requires management judgment. At the other end of the spectrum, follow-up action plans can result

Appendix C:

Expanded Discussion on REIMSAP Conceptualization

1.0 Expanded Discussion on REIMSAP Model Conceptualization

1.1 Audit Scope Based on Functional Business Area and/or Geographic Location

It is important to note that the audit components described in Table 3.5-1 (see Chapter 3) should overlap and should be interwoven for an EMS audit in an energy utility. Furthermore, certain coverage components will lead to the coverage of other components. In Table 3.5-1, certain components serve to narrow scope (i.e. area or personnel to be covered) and certain components serve to narrow EMS coverage (i.e. ISO 14001 elements and other requirements to be covered).

Auditing within a functional business area and geographic location does not imply that internal auditors focus on all facets of the business area's operations and all applicable EMS elements. Auditing based on functional business area and location is a broad scope component that needs to be drilled down into sub-components to focus EMS coverage and to further focus audit scope. For instance, auditing based on functional business area and geographic location could be drilled down into auditing based on specific environment related operational control within that particular business area and location. An example of this case would be auditing of dam maintenance controls at a hydro-electric generating station in the northern part of the province. With the exception of the coverage based on EMS management review processes, any one of the EMS coverage components described in Table 3.5-1 can fall under the scope of auditing within a functional business area and geographic location.

In an energy utility, the operations of certain business areas will present more environmental risks than others. For instance, an administrative financial department located in an office building can cause considerably less environmental damage than a department dedicated to apparatus maintenance involving the overhaul of equipment. Consequently, there will be a need to audit certain business areas more frequently than others, and there may be no need to audit certain business areas. Based on SCCD, it may be discovered that a representative sample of hydro-electric, thermal, nuclear and gas generation facilities, as well as maintenance service shops should be audited at least once per individual internal EMS audit or at least once over the duration of an internal EMS audit program.

Assuming that facilities and centralized maintenance shops fall under a departmental level, several facilities or shops may be grouped under one division that is based in a specific geographic region. There may also be business areas that are not centrally located such as departments dedicated to transmission and distribution line maintenance throughout an entire province. Internal EMS auditing may be scoped according to business area and geographic location, or according to the business area without reference to geographic location.

Auditing based on functional business area and geographic location cannot define the entire scope of the internal EMS audit. There needs to be scoping sub-components to define the actual auditees (i.e. auditees are people, not locations). For example, if a program is being audited within a functional business area based on location, then a scoping sub-component should include functional employees connected to the implementation and PM of said program. Also, because an EMS is a management tool, it is important to cover all levels of management down to individual employees. This implies that there should be further scoping sub-components covering management interfaces related to the EMS coverage components. Therefore, although the primary scope of the internal EMS audit may be within a functional business area, the interfaces of the business area also need to be assessed. Audit activity should not be confined to the boundaries of a department without assessing the cross-functionality of activity and the flow of information and decisions affecting the department's operations. For example, if a particular program is being audit within a functional business area based on geographic location, then it might be important to audit the Division or Department Manager who is accountable for and responsible for acting on the performance of the program. The scoping sub-component would be defined as auditing of functional management related to the program. This person could potentially be outside of the scope of the primary business area, but within the scope of a higher-level business area.

Certain EMS coverage components should be assessed more thoroughly at a line employee level, a departmental management level and a divisional management level. In the planning phase of an internal

EMS audit, the key link to assess risks, priority EMS coverage components and any other related issues of concern within a functional business area is the divisional manager. As the planning phase narrows down the scope of the internal EMS audit, if it is deemed necessary to audit within a certain business area (e.g. Division or Department), then a preliminary communication meeting should be held with the Lead Internal EMS Auditor and Division Manager prior to developing the final audit plan.

In the SCCD phase, the divisional manager in charge of several departments (e.g. generating facilities, converter facilities, apparatus maintenance shops, engineering service type departments…etc.) can provide direction on the high risk departments and activities to be audited, information on the nature of the risks, and advisement on expected conditions and EMS related performance criteria within their division. For example, say that a new transformer is being installed at a converter station. It may be logical to audit during such an installation to assess whether operational control practices for the transportation of dangerous goods and handling of hazardous wastes are being followed by line employees. Another example is the case of turnover. Say that one department has a considerably higher turnover rate compared to other departments, it may be logical to audit facets of training, awareness and competence within that department.

It is possible to assess the majority of ISO 14001 elements in a business area based on function and geographic location; however, as mentioned, certain elements take priority based on risks and certain elements are key at different organizational levels. At an employee level, key points to assess include the following:

- Awareness of and adherence to operational control, emergency control, regulatory compliance control, and other control frameworks (e.g. processes and codes of practice)
- Knowledge of communication links related to emergency response situations, environmental concerns, and any relevant result-based EPM activities including those for programs and regulatory compliance
- Knowledge of designated responsibilities under the scope of the EMS including program implementation responsibilities and awareness of program performance criteria
- Evidence of adequate training being provided to ensure competence related to managing the potential environmental risks inherent in performing designated responsibilities

At a departmental management level, key points to assess include the following:

- Awareness of environmental aspects, potential impacts, and environmental and safety risks under their scope of management
- The BP processes and associated interfaces. May include management's awareness of performance related to defined objectives, targets, programs, and corrective and preventive actions. May include assessment of considerations for environmental BP. May include assessment of linkages to higher-level BP processes
- Awareness, maintenance and use of EM controls. May include assessment of the use of regulatory compliance control processes such as self-assessments measurement schemes to provide assurance on compliance and a basis for planning corrective or preventive actions
- Knowledge of internal and external communication interfaces related to EMS planning and action
- The maintenance and communication of EMS and SMS requirements, operational control requirements and documentation, and emergency response plans
- Evidence of maintained EMS related records and documents.

At a divisional management level, operational control and emergency control are not as important in comparison to a departmental management level. The reason for this is that the responsibility for communicating and deploying such requirements, obtaining feedback on their effectiveness, providing input to operational control and emergency control leads, and providing feedback to divisional managers falls under line or department managers. Therefore, at a division manager level, there should be some evidence that feedback is being provided from department managers on operational and emergency controls to assure adherence to the regulations and requirements upon which they are built. More importantly at a division manager level, however, is evidence that EPM data and information is flowing up the organizational ladder. Accordingly, internal and external lines of communication are key elements to assess based on the responsibilities of a division manager. Division managers should have an awareness of

performance related to environmental objectives, targets, programs and local improvement initiatives within their area of management. They should be able to provide evidence that such performance is factoring into business area decision making. Furthermore, with input flowing from higher organizational levels, division managers are responsible for setting direction and delegating action within their area of management.

The need to assess communication interfaces also applies to Business Unit Vice-Presidents, who need input from divisional management and direction from Corporate Committees, the President and the Board of Directors in order to systematically manage changing conditions and the environmental aspects of their business units.

1.2 Audit Scope Based on Personnel

In addition to defining the areas and locations to be audited, audit scope should define the auditees or people to be audited. This implies that auditing a representative sample of personnel and business areas within an energy utility can depict the full functioning of the EMS throughout a company. People drive the implementation of an EMS and, as depicted through proposed EPM structures and processes for energy utilities, there are filter points for the flow of EMS related data, information and decision making. Before an audit can be fully scoped and planned, the Lead Internal EMS Auditor needs to consult certain filter point personnel. The filter personnel represent the strongest link for the integration of system and result-based EPM. The filter personnel can direct the Lead Internal EMS Auditor to further communication links depending on the desired coverage components of the EMS audit. The Environmental Performance and EMS Coordinators, OS&H Department Manager, operational and emergency control lead personnel, internal experts on specific fields, and management at divisional and departmental levels can all provide some insight into what should be assessed, who should be audited, and criteria against which to assess systemic performance.

The following sub-sections discuss potential auditees and considerations applicable to each coverage component described in Table 3.5-1.

1.2.1 Audit Coverage of Environmental or Safety Management Program

If audit risk assessment or the audit program parameters recommended by the Corporate EMRC call for auditing of an EMS or SMS related program, then the Lead Internal EMS Auditor should first seek out the highest level filter point: the person accountable for the performance of the program. Depending on the depth and cross-functionality of a program, the person accountable can be at any management level. One employee or several may be delegated responsibility for the implementation of a program and the communication of performance data, while different personnel could be responsible for analyzing data and acting on performance information. In the course of conducting the audit, the Lead Internal Auditor could eventually end up interviewing both implementation and performance lead personnel. During the planning phase, the person ultimately accountable for program performance and responsible for delegating action should be consulted because they represent the management thread between the program, performance, management control, and decision making. Another conundrum rises because program implementation responsible departments may fall under a separate division from the division responsible for program coordination and management. This depends greatly on the structure established for particular environmental programs.

In linking the person accountable for program performance with the Lead Internal EMS Auditor prior to the developing the final audit plan, result-based EPM data and information can be integrated with audit planning. If a program is not performing or there are considerable safety and environmental risks and controls surrounding the program, then the person accountable for performance, or Program Manager, should be capable of informing the Lead Internal EMS Auditor on expected program conditions, why the program is not performing, and on any priority risks surrounding the program. Furthermore, the Program Manager should be capable of providing information on the management controls surrounding the program,

which might include operational and emergency controls, PM requirements and activities, feedback and measurement communication channels, and program plan provisions such as budget, schedule, terms of reference …etc. This will provide certain criteria against which to audit the program. The information shared should be based partially on quantitative or qualitative result-based EPM data and information from lower organization levels, direction from upper management, and on the knowledge and awareness of the Program Manager.

Throughout the SCCD process, the focus of the Lead Internal EMS Auditor may also be directed to particular programs through communication with the Business Unit and Corporate Environmental Performance and EMS Coordinators. Based on their awareness of overall EMS performance, these Coordinators can provide valuable insight into the performance and risk elements of programs at corporate and divisional levels. Direction to Program Managers can stem from consultation with the Environmental Performance and EMS Coordinators. As well, EPM data and information conveyed to them through feedback channels can be shared with the Lead Internal EMS Auditor. In other words, these Coordinators can advise the Lead Internal EMS Auditor on whom to consult regarding a particular program and the performance conditions reported.

1.2.2 Audit Coverage of BP Processes

For EMS audit coverage of the BP processes, the key filter points for performance data and information are the Environmental Performance and EMS Coordinators. These Coordinators can serve to narrow audit coverage down to specific high-risk environmental objectives, targets and programs. Furthermore, these Coordinators can serve to narrow scope down to specific divisions or departments that have the greatest environmental risks associated with their operations and that have certain high priority environmental objectives, targets and programs. The direction provided depends on result-based EPM data and information used to assess performance and define risks and priorities.

In assessing BP, it is key to assess conformance to the planning elements of ISO 14001 (i.e. environmental policy, aspects, objectives and targets, and programs), the alignment of department, division, business unit and corporate level business plans, the achievement of business plan elements (i.e. environmental objectives, targets and programs), the environmental measurement processes for the business plan elements, and the use of performance data and information for decision making. In the execution of the audit, this could involve interviewing department, division and business unit managers, specific measurement representatives, and any other employees supplying input to the processes. It could also involve observing business plan review meetings at various levels.

As part of the scoping process, specific business plans should be reviewed as part of the document review. For example, if audit parameters called for or the Lead Internal EMS Auditor deemed necessary the audit of an Apparatus Maintenance Division, then, clearly, the Lead Internal EMS Auditor needs to read the divisional business plan to highlight EMS related actions that are being undertaken and delegated through the division. As the driver for the setting of EMS objectives, targets and programs, auditing within a functional business area implies that some form of BP process assessment should transpire. If audit coverage is based on the BP process within a functional business area, then a scoping sub-component would serve to identify functional personnel and management related to that process.

1.2.3 Audit Coverage of Operational Control and/or Emergency control Frameworks

For internal EMS audit coverage of operational control and emergency control frameworks, it is important to assess systemic performance from two perspectives. First, are the operation control and emergency protocols being followed at the implementation level, and, second, are they being maintained at the appropriate levels. From the first perspective, the execution of an internal EMS audit should involve observation and interviewing at an individual employee level. Further, the execution of the audit should involve interview at a department manager level to assess whether management has appropriately communicated and kept up-to-date regarding the operational control and emergency requirements. This

interview would also serve to assess whether feedback is being received with respect to the suitability and effectiveness of operational control and emergency requirements within particular business areas and whether such feedback is being transferred to lead personnel who can use and apply such information.

From the second perspective, there should be business unit and corporate level lead personnel or experts on specific operational control and emergency control fields. In scoping an internal EMS audit, it is important that the Lead Internal EMS Auditor consult the highest-level Core or Non-Core Operational Control and Emergency Control Leads who are responsible for the maintenance of operational and emergency control related documentation, policies and protocols. In consulting these lead experts, there is another link between result and system-based EPM. These lead experts should receive feedback on the implementation and effectiveness of operational and emergency controls. They should also have communication ties external to the company to maintain awareness of changing issues surrounding their field of expertise. Therefore, the lead experts should be capable of informing the Lead Internal EMS Auditor on specific criteria against which to audit operational and emergency control frameworks (i.e. the conditions expected in the field), key areas of concern based on qualitative result-based EPM, and significant risks or changing conditions affecting the content, maintenance and use of operational control and emergency control frameworks.

It is important to note that lead personnel for the maintenance of operational control and emergency control frameworks may or may not have directive authority over department managers and individual staff. For instance, although emergency response related protocols and guidelines may be maintained at a corporate level by a Corporate Emergency Control Official, emergency response plans should be maintained by department managers who direct the staff responsible for implementing such plans in emergency situations. These plans should then be objectively tested periodically by delegates of the Corporate Emergency Control Official, with feedback provided to both the Department Manager and Corporate Emergency Control Official. In such cases, EMS audit scope should cover both control implementation and maintenance related personnel.

Because environmental and safety legislations can be extensive and complex, there may be simplified "how-to" guides, operational and emergency control documents, and other company protocols based on such legislations. For core operational controls and emergency protocols, a self-assessment scheme capturing applicable regulatory compliance and other requirements should be established throughout the energy utility. This would be maintained by the OS&H Department. Corporate level feedback and analysis of performance based on the self-assessment scheme would be provided to the Corporate Health and Safety Committee by the OS&H Department Manager who directs and maintains communication with the Corporate Core Operational and Emergency Control Lead Personnel. Therefore, the OS&H Department Manager should also be capable of providing direction on high risk areas, contact people, and issues of concern (e.g. major incidents and spills) related to core operational and emergency controls.

For non-core operational controls based on regulatory compliance, a similar self-assessment scheme should be established. There would be different personnel responsible for maintaining and directing action on the non-core operational control frameworks, and the Non-Core Operational Control Leads could fall under any management level of the Corporation. These leads could provide the Lead Internal EMS Auditor with criteria information related to control requirements, risk issues, and performance conditions to expect, as well as direction to personnel and business areas implementing the non-core operational controls.

If self-assessment is not practical, there should still be some form of review or check to assess control and compliance performance. In certain cases, this may be based entirely on verbal feedback and communication, or this may be supported by measurement activity. In other cases, auditing (e.g. compliance audit initiated by a regulator, an EMS audit…etc.) can be the means by which this assessment is conducted.

1.2.4 Audit Coverage of Regulatory Compliance Frameworks and Issues

For regulatory compliance frameworks within an energy utility, an EMS audit should assess how management is ensuring that their business area's operations are in compliance with legislated environmental and safety related regulations. This does not imply compliance auditing, which is a detailed and meticulous assessment of particular legislation within a company or business area to determine compliance to requirements, policies, practices and procedures that have been based on the particular legislated regulations. Internal EMS audits that drill down and assess control frameworks for regulatory compliance preclude the need for an extensive compliance auditing program within an energy utility; however, this is provided that controls exist throughout the company to provide regulatory compliance assurance to management. For an energy utility, the proposed process for EPM related to regulatory compliance calls for a self-assessment scheme. Self-assessment schemes throughout an energy utility would vary according to different legislations, regulations, regulatory compliance related controls, licenses, and permits. If self-assessment is not viable, then there should still be some form of localized compliance review supported by feedback and/or measurement.

To assess whether compliance controls are working, the Lead Internal EMS Auditor should be assessing adherence to the controls in the field, the feedback channel for compliance related data and information up the organizational ladder, and the use of such information to manage compliance and maintain the control frameworks. In the audit execution, this may involve tracking non-compliances or interviewing from a field employee level up to business unit and corporate management levels.

Certain business areas will pose more risk related to regulatory compliance than others. Consequently, the SCCD process should aim to identify those areas of high-risk and those issues of concern. The use and breakdown of measures such as number of regulatory non-compliances or number of citations can facilitate the audit planning process. The Lead Internal EMS Auditor should be consulting with the Environmental Performance and EMS Coordinators as a filter point for feedback on certain regulatory compliance issues and for direction to risk areas and contact people.

It is important to note that regulatory compliance controls may fall under the scope of operational control and emergency control frameworks. In other words, regulatory compliance control may be a part of operational and emergency controls having specific requirements related to regulatory compliance. Contact with the OS&H Department Manager, Operational Control Lead Personnel and Emergency Control Lead Personnel may also be necessary prior to finalizing the internal EMS audit plan if the audit is to cover regulatory compliance control or issues.

1.2.5 Audit Coverage of Emerging Environmental Risk or Issue

Auditing based on emerging risks and issues depends on external pressures on an energy utility. A company implementing an EMS should be committed to continual improvement, and, as a result, it should be able to adapt to rapidly changing environments and concerns. Auditees for this coverage will depend on responsibility for responding to emerging risks and opportunities. During the scoping process, the need to audit such issues may stem from Corporate EMRC parameters, conversation with EMS Coordinators, conversations with internal resident experts on specific fields (e.g. operational and emergency control leads, internal experts on greenhouse gas emissions, law department experts…etc.), and through EMS management review processes.

Auditees will include the personnel responsible for monitoring and communicating issues, opportunities and risks surrounding a particular field, personnel responsible for planning and directing response action, personnel responsible for implementing response action, and personnel accountable for the performance of response action.

1.2.6 Audit Coverage of EMS Management Review Process

Auditing of the EMS management review process is a component of an internal EMS audit that may open doors to further risks, areas, issues, and people to audit. The SCCD process should involve a review of documentation related to the EMS management review. In the execution of the audit, assessment of the EMS management review process can be done through document review, observation of a review meeting, through tracking of corrective and/or preventive action, and/or through interview of review team members. Auditees for this coverage depend on the level of the EMS review (i.e. corporate or business unit level EMS review) and responsibilities for corrective and preventive actions.

The ISO 14001 element on management review leaves much to interpretation on the considerations and information necessary to review the continuing suitability, adequacy and effectiveness of the EMS within an energy utility. The assessment of EMS management review processes and their conformance to the ISO 14001 standard requirements involves judgment from auditors.

It is important to note here that management review processes may not require in depth coverage through an internal audit. If surveillance audits are being conducted by external auditors, there will always be an assessment of the EMS management review processes to adequately cover all of the EMS elements. Internal EMS audit coverage of the EMS management review processes may duplicate this effort. Consequently, prior external audits should be considered in the audit SCCD process, and duplication effort should be minimized.

1.2.7 Audit Coverage of Follow-up Action

The need to audit follow-up action depends on the nature of follow-up action. There are variables in terms in terms of follow-up action resource requirements and priority. Follow-up action can range from localized response actions requiring minimal effort to corporate wide action involving several different business areas and functions. Certain follow-up actions may not warrant audit coverage. The need for such coverage should be assessed by the Lead Internal EMS Auditor, but may be directed by client specified audit program parameters.

Audit coverage of follow-up action involves assessment on the status, effectiveness, and/or proper implementation of follow-up action. Auditees for this coverage include personnel with follow-up implementation responsibilities and management accountable for the performance of follow-up action. The Corporate and Business Unit EMS Coordinators should maintain awareness on the performance of follow-up actions and could be consulted to assess the need for follow-up coverage and discuss follow-up scope and criteria requirements.

1.2.8 Audit Coverage of EMS Supporting Tools

Internal EMS auditing that covers EMS supporting tools or controls such as software should assess whether supporting tools or controls are being implemented, used, and maintained. This will require that the Lead Internal EMS Auditor interview relevant users of the supporting controls and the personnel responsible for up-keeping the controls. Consultation with the personnel responsible for maintaining the controls may be necessary during the SCCD phase to determine expected conditions throughout the company. Depending on the nature and extent of supporting tools or controls throughout the company, direction to contact people could be provided through communication with the Environmental Performance and EMS Coordinators or through communication with the OS&H Department Manager.

Appendix D:

Supporting Tables and Guidelines for Proposed Internal EMS Audit Categorization Scheme

Tables D1 – D8: Rationale for Potential Auditees Based on Proposed Internal EMS Audit Scope and Coverage Components

Table D1: Rationale for potential auditees with BP processes as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of BP Processes	Rationale for Auditing Personnel or Management (i.e. Potential Auditee Responsibilities)
Corporate Environmental Performance and EMS Coordinator	- Develops list of proposed corporate environmental objectives - Maintains awareness of corporate environmental performance related to objectives, targets, and programs and linked to business unit environmental performance - Analyzes corporate environmental performance related to environmental objectives, targets and programs and communicates performance information and action recommendations for the Corporate Strategic Plan and corporate EMS management review processes - May recommend revisions to environmental policy
Lead EPM Representatives for Corporate Strategic Plan	- Provide Corporate Environmental Performance Coordinator with EPM data and information for corporate level objectives and targets - Perform EPM data collection, communication, and some analysis
Corporate EMRC Representatives	- Review suggested environmental policy revisions and proposed corporate level environmental objectives - Provide recommendations to the Executive Management Committee on corporate level environmental objectives and environmental policy - Perform the corporate level EMS management review with consideration given to corporate environmental performance
Business Unit Environmental Performance and EMS Coordinators	- Develop list of proposed business unit environmental objectives - Maintain awareness of business unit environmental performance related to environmental objectives, targets and programs that may be linked to division and department environmental performance - Information provider for business unit business plan and EMS management review processes - Provide Corporate Environmental Performance and EMS Coordinator with information on business unit environmental performance that may be linked to corporate level environmental performance

Table D1: Continued

Executive Management Committee Representatives	- Approve environmental policy - Review environmental objectives for inclusion in Corporate Strategic Plan and provide approval - Set corporate level environmental targets and measures - Perform Corporate Strategic Plan review with input from Corporate Environmental Performance and EMS Coordinator
Lead EPM Representatives for Business Unit Business Plans	- Provides EPM data and information to the Business Unit Environmental Performance and EMS Coordinator - May fall under a division, department or individual staff level - May be associated with the implementation of specific environmental program or operational control framework (e.g. Could be the Manager of a specific program or could be a Business Unit Core Operational Control Lead)
Business Unit Vice-Presidents	- In consultation with Division Managers, develops business unit business plan including the setting of environmental objectives, targets and measures - In consultation with Division Managers, directs business unit business plan review process
Division Managers	- Provides updates on divisional environmental objectives, targets and programs to the Business Unit EPC and EMS Coordinator - May be responsible for acting on performance and for delegating action related to specific division level environmental programs - Partake in the business unit business plan review process - In consultation with Deptartment Managers, develops division business plan and directs division business plan review process - Partake in business unit level EMS management review process
Department Managers	- In consultation with Staff, develops department business plan and directs department business plan review process - Provides updates on department environmental objectives, targets and programs to the Division Manager - May be responsible for acting on performance and delegating action on specific departmental programs

Table D1: Continued

Employees Responsible for Specific EPM Activities and Staff Responsible for the Implementation of Specific Environmental Programs and Initiatives	- May be responsible for physically measuring EPM data - Provide EPM data and information to the Department Manager and to other Lead Representatives for EPM at different levels and/or in different business areas, as applicable - Maintain awareness of performance and requirements for assigned or delegated environmental program implementation

Suggestions on what is key to assess in the internal EMS audit of corporate, business unit, division or department level BP processes:

- Is the environmental policy relevant and defined according to the ISO 14001 criteria
- Is the environmental policy being maintained at the corporate level
- Is the environmental policy consistent with corporate level environmental objectives
- Have corporate level environmental aspect categories been identified according to defined procedures and are they considered in the setting of environmental objectives
- Are corporate, business unit, division and department level environmental objectives and targets being set according to defined considerations including environmental aspects and policy
- Have corporate level environmental programs been defined according to ISO 14001 criteria
- Are business unit, division and department level environmental objectives and targets consistent with the environmental policy and higher level environmental objectives and targets (e.g. division objectives and targets aligned with business unit objectives and targets)
- Are business unit, division and department level environmental programs defined according to ISO 14001 criteria
- Are monitoring and measurement mechanisms in place for corporate, business unit, division and department level environmental objectives, targets and programs
- Is EPM data and information on environmental performance at the applicable level being provided to lead EPM personnel, Division and Department Managers, and Corporate and Business Unit Environmental Performance and EMS Coordinators
- Is EPM data and information being analyzed by the Corporate and Business Unit Environmental Performance and EMS Coordinators, and is environmental performance information being communicated as an input to the appropriate review forums (e.g. Business Unit Environmental Performance and EMS Coordinator providing input into business unit business plan review process and business unit EMS management review process)
- Have the appropriate lines of communication been established and followed between the Executive Management Committee, the Corporate EMRC, the Corporate Environmental Performance and EMS Coordinator, Business Unit Environmental Performance and EMS Coordinators, Lead EPM Personnel, Business Unit Vice-Presidents, Division Managers, Department Managers and staff
- Is environmental performance data and information consistent at the applicable levels
- Are staff responsible for implementing specific environmental programs aware of the requirements of said programs including operational and emergency control requirements
- Are staff responsible for implementing specific environmental programs aware of the program relation to environmental policy and applicable environmental objectives and targets
- Have staff responsible for implementing specific environmental programs received the appropriate training, education and/or experience to do so according to program requirements
- Are business plan and EMS management review processes being undertaken according to ISO 14001 criteria
- Are business plan and EMS management review processes leading to the identification of risk areas and the development corrective and preventive actions related to environmental objectives, targets and programs (i.e. are they capable of leading to continual improvement)

- Have corrective and preventive actions stemming from business plan review processes been implemented according to defined criteria in action plans and from internal criteria determination sources

ISO 14001 elements that can be covered under an internal audit of corporate, business unit, division or department BP processes:

- Section 4.2 Environmental Policy
- Section 4.3.1 Environmental Aspects at a corporate level
- Section 4.3.2 Legal and Other Requirements in terms of their consideration in review processes and in setting environmental objectives and targets
- Section 4.3.3 Objectives and Targets
- Section 4.3.4 Environmental Management Program(s) (Note that Section 4.3.4 should be covered in more depth using EMS or SMS Programs as the primary coverage component)
- Section 4.4.1 Structure and Responsibility
- Section 4.4.2 Training, Awareness, and Competence for specific departmental programs (Note that Section 4.4.2 can be covered in more depth using EMS or SMS Programs or Operational and Emergency Control Frameworks as the primary coverage component)
- Section 4.4.3 Communication part a) in terms of communication between the following:
    - Corporate and Business Unit Environmental Performance and EMS Coordinators
    - Corporate Environmental Performance and EMS Coordinator and Lead Measurement Representatives for the Corporate Strategic Plan
    - Corporate Environmental Performance and EMS Coordinator and the Corporate EMRC
    - Corporate EMRC and the Executive Management Committee
    - Business Unit Environmental Performance and EMS Coordinators and Lead EPM Personnel for business unit business plans
    - Business Unit Environmental Performance and EMS Coordinators and Division Managers
    - Business Unit Environmental Performance and EMS Coordinators and the applicable Business Unit EMS Management Review Team
    - Business Unit Environmental Performance and EMS Coordinators and the applicable Business Unit Business Plan Review Team
    - Lead EPM Personnel for the business unit business plans and staff responsible for physical EPM and the implementation of specific environmental programs
    - Lead EPM Personnel at different levels
    - Department Managers and staff responsible for physical EPM and the implementation of specific environmental programs
    - Division and Department Managers
- Section 4.4.4 Environmental Management System Documentation related to environmental objectives and targets
- Section 4.4.5 Document Control related to environmental objectives and targets
- Section 4.5.1 Monitoring and Measurement for environmental objectives, targets and programs
- Section 4.5.2 Nonconformance and Corrective and Preventive Action as an output of the EPM data and information review processes (e.g. business plan and EMS management review processes)
- Section 4.5.3 Records related to business plan and EMS management review processes
- Section 4.6 Management Review in terms of the consideration of business plan elements (environmental objectives, targets, and programs) and associated performance as an input to the process

Table D2: Rationale for potential auditees with EMS or SMS program as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of EMS or SMS Program	Rationale for Auditing Personnel or Management (i.e. Auditee Responsibilities)
Program Manager	- Accountable for program performance - Responsible for analysis of EPM data and information and reporting program performance to higher level management if applicable - May be at corporate, business unit, division, department or individual staff level - Depending on the level of the program, may or may not have authority to direct line action - May be responsible for setting program criteria including program deliverables and requirements - Responsible for communicating program requirements to the applicable levels - May be responsible for delegating or providing recommendations on program action including corrective and preventive action
Corporate EMRC Representatives	- Conduct corporate level EMS management review process that may consider corporate level program performance - May be responsible for providing recommendation to the Executive Management Committee on corporate level program related action
Corporate Health and Safety Committee Representatives	- Assess performance related to corporate level safety and health objectives, targets and programs - May be responsible for recommending program related action to Executive Management Committee
Business Unit Vice-Presidents, Division Managers and/or Department Managers	- May be the Program Manager - May be responsible for reviewing program performance and directing action related the program - Maintain awareness of program performance, requirements and associated controls - May partake in the business unit EMS management review process that considers program performance as an input to the process
Staff Responsible for Program Implementation and EPM Activities	- Responsible for performing actions required to implement the program - Maintain awareness of program requirements and associated controls - May be responsible for physically measuring, collecting and communicating environmental performance data and information
Corporate Core Operational Control and Emergency Control Lead Representatives	- May be the Program Manager - Responsible for the maintenance of certain operational control and emergency control frameworks associated with programs including analysis of related EPM data and information, directing changes to related documentation, and recommending corrective and preventive action

Table D2: Continued

Business Unit Core Operational Control and Emergency Control Lead Personnel	- Responsible for providing advisement within business unit on assigned operational control or emergency control framework - Responsible for undertaking certain tasks associated with implementation of operational control or emergency control frameworks (e.g. tasks related to EPM data collection, analysis, reporting and follow-up) - Maintains awareness of performance related to assigned operational control or emergency control framework, which may be linked to program performance
Non-Core Operational Control Framework Lead Representatives	- May be the Program Manager - Responsible for the development and maintenance of non-core operational control frameworks (i.e. business area specific operational controls) affecting program implementation including analysis of related EPM data and information, directing and communicating changes to requirements and related documentation, and recommending corrective and preventive action

Suggestions on what is key to assess in the internal EMS audit of corporate, business unit, division, or department level EMS and SMS related programs:

- Has the EMS or SMS program been established according to ISO 14001 criteria
- Are monitoring and measurement mechanisms in place for program related EPM activities
- Is EPM data and information being provided to the Program Manager
- Is EPM data and information being analyzed and applied by the Program Manager (e.g. for recommendations or for decisions on corrective and preventive actions)
- Is environmental performance information on the program being assessed and applied at an applicable level (e.g. Program performance information and Program Manager recommendations considered by the Corporate EMRC in EMS management review process)
- Have lines of communication between the Program Manager and staff responsible for the implementation of the program and EPM activity been defined and followed, and is the program performance data and information consistent at the applicable levels
- Have program requirements been communicated to the program implementation level, and is the interpretation of program requirements consistent at the Program Manager and implementation levels
- Are program performance conditions at an implementation level consistent with the expectations the Program Manager
- Are program requirements including procedures, operational and emergency controls being followed at the program implementation level
- If applicable, have lines of communication between the Program Manager and higher level management been defined and followed, and is performance information consistent at both levels
- If applicable, have lines of communication between the Program Manager and Core or Other Operational Control and Emergency Control Lead Personnel been defined and followed, and is information (e.g. control requirements and related performance data and information) consistent at the applicable levels
- Are program controls (i.e. operational, emergency response, regulatory compliance…etc.) being maintained at the appropriate level
- If applicable, have lines of communication between staff responsible for program implementation and Core or Other Operational Control and Emergency Control Lead Personnel been defined and followed, and is information consistent at the applicable levels

- Are implementation staff competent to perform program responsibilities according to the defined requirements and controls based on education, training and experience
- Is program documentation being controlled according to ISO 14001 criteria
- Is program performance being considered as an input to the appropriate EMS management review processes

ISO 14001 elements covered under audit of corporate, business unit, division, or department level EMS and SMS related programs:

- Section 4.3.4 Environmental Management Program(s)
- Section 4.4.1 Structure and Responsibility in terms of the provision of resources to accomplish programs
- Section 4.4.2 Training, Awareness, and Competence at a program implementation level
- Section 4.4.3 Communication part a) in terms of communication between the following:
    - Program Manager and staff responsible for the program implementation and associated EPM activities
    - Program Manager and higher level management, if applicable
    - Program Manager and Core or Other Operational and Emergency Control Lead Personnel, if applicable
    - Staff responsible for program implementation and Core or Other Operational and Emergency Control Lead Personnel, if applicable
- Section 4.4.5 Document Control associated with EMS or SMS program, if applicable
- Section 4.4.6 Operational Control linked to specific EMS or SMS program, if applicable
- Section 4.4.7 Emergency Preparedness and Response linked to specific EMS or SMS program, if applicable
- Section 4.5.1 Monitoring and Measurement
- Section 4.5.2 Nonconformance and Corrective and Preventive Action through program review forums (e.g. business plan reviews, specific EMS or SMS program reviews and EMS management reviews)
- Section 4.5.3 Records linked to specific EMS or SMS program, if applicable
- Section 4.6 Management Review related to the consideration of program performance information on certain EMS or SMS programs as an input to the process

Table D3: Rationale for potential auditees with operational control or emergency control framework as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of Operational or Emergency Control Framework	Rationale for Auditing Personnel or Management (i.e. Auditee Responsibilities)
Corporate Core Operational Control or Emergency Control Leads	- Responsible for the maintenance of core operational control documentation or emergency protocol documentation including communication of maintenance requirements to business unit level lead personnel - Responsible for analyzing performance information related to assigned operational control or emergency control field and providing OS&H Department Manager with performance information - No directive authority, but responsible for providing recommendations and advisement on actions related to assigned operational or emergency control field to OS&H Department Manager - May be responsible for periodically testing operational and emergency control procedures - Provide input to SMS review process
Business Unit Core Operational and emergency control Lead Personnel	- Have specific responsibilities related to the implementation and maintenance of assigned operational or emergency control frameworks that may include collecting performance data and information and communicating it to the corporate level leads - Provide advisement on assigned operational or emergency control field throughout business units - Maintain awareness of performance related to assigned operational or emergency control field - May communicate operational and emergency control framework maintenance requirements to applicable Department Managers
Non-Core Operational Control Lead Personnel	- Responsible for the development and maintenance of operational control documentation and frameworks for non-core operational controls that apply to specific functional activities - May be at any level of the Corporation, but may or may not have directive authority in terms of operational control implementation - Perform similar duties to Corporate Core Operational Control Leads, but reporting to different level

Table D3: Continued

OS&H Department Manager	- Responsible for collecting EPM data and information, providing some analysis, and preparing report for Corporate Safety and Health Committee on SMS performance that covers the effectiveness of core operational and emergency control frameworks under the scope of the Occupational Health and Safety Department - Serves as an information provider to the Corporate Safety and Health Committee and maintains awareness of performance under the scope of corporate level safety and health management - Provides Corporate Safety and Health Committee with recommendations on action related to corporate level safety and health objectives, targets, programs and management control frameworks including core operational and emergency control frameworks - Provides input to SMS review process
Law Department Experts	- Support Core and Non-Core Operational and emergency control Leads with advisement on environmental legislation and regulation
Corporate Health and Safety Committee Representatives	- Perform performance review of corporate level safety and health objectives, targets, programs, and management control frameworks - Responsible for providing recommendations to the Executive Committee based on their review including recommendations on the need to change safety and health related management control frameworks
Executive Management Committee Representatives	- May be responsible for directing action related to the implementation and maintenance of operational and emergency control frameworks - May plan and direct the implementation of corrective or preventive actions related to regulatory non-compliances upon which operational controls and emergency response plans are based
Corporate EMRC Representatives	- Conduct corporate level EMS management review process that may consider performance related to core operational or emergency control frameworks - May recommend action related to operational or emergency control frameworks
Business Unit EMS Management Review Team Representatives	- Conduct business unit EMS management review process that may consider performance related to core and non-core operational and emergency control frameworks - May recommend action related to operational or emergency control frameworks

Table D3: Continued

Safety Management System Review Team Representatives	- Responsible for reviewing, developing and maintaining the SMS measurement or self-assessment scheme for operational and emergency control frameworks - Receive input from OS&H Department personnel including the Department Manager and Corporate Core Operational Control Leads
Division Managers	- Maintains awareness of operational and emergency controls that guide the activities under their scope of management
Department Managers	- Responsible for communicating operational and emergency control requirements to employees under scope of management - Directs employee actions related to the implementation of operational and emergency control frameworks - Collects EPM data and information, and provides feedback to the applicable lead personnel on the effectiveness and implementation of operational and emergency control frameworks - Maintain emergency response plans
Staff Responsible for Performing Activities According to Operational and Emergency Control Requirements	- In performing operational duties, responsible for adhering to applicable operational and emergency control requirements - May perform result-based EPM related to the implementation and effectiveness of core and non-core operational and emergency control frameworks (e.g. self-assessment type measurement) - May report EPM data and information on the implementation and effectiveness of operational and emergency control frameworks to Department Managers and to Operational or Emergency Control Lead personnel, as applicable

Suggestions on what is key to assess in the internal EMS audit of corporate, business unit, division, or department level operational and emergency control frameworks:

- Are operational controls established according to ISO 14001 criteria
- Are emergency preparedness and response procedures established according to ISO 14001 criteria
- Are Division and Department Managers aware of operational and emergency controls applicable to their area of management
- Are Department Managers communicating operational and emergency control requirements and expectations to their staff
- Are staff aware of operational and emergency control requirements, and are staff adhering to these requirements in performing their responsibilities (note that responsibilities may include implementation of an EMS program)
- Are measurement mechanisms in place for monitoring and measuring the performance of operational and emergency control procedures
- Have the appropriate lines of communication been defined and followed between Law Department Experts, Corporate Core Operational and Emergency Control Leads, Business Unit Core Operational and Emergency Control Leads, Non-Core Operational Control Leads, Department Managers, Division Managers and staff responsible for implementing operational and emergency control procedures and requirements

- Are operational and emergency control procedures being maintained at all applicable levels (e.g. Are Corporate Core Operational Control Leads receiving EPM data and information on the effectiveness and implementation of assigned operational control, analyzing, and using such information in preparing recommendations and modifying associated documentation)
- Is EPM data and information on the implementation and effectiveness of operational and emergency controls consistent at the applicable levels (e.g. Is the EPM data and information in the field consistent with the data and information received at the Department Manager level)
- Are there mechanisms in place to review the effectiveness and implementation of operational and emergency control frameworks, and are these mechanisms leading to the development of corrective and preventive actions
- Are corrective and preventive actions on operational and emergency control frameworks being directed and implemented according to applicable criteria defined in action plans and through consultation with relevant internal criteria determination sources (note that this overlaps with maintenance of operational and emergency control control frameworks)
- Is operational and emergency control documentation being controlled according to ISO 14001 criteria
- Is staff responsible for adhering to operational and emergency control requirements competent to do so on the basis of training, education and experience
- Are lead personnel responsible for developing and maintaining operational and emergency control requirements competent to do so on the basis of training, education and experience

ISO 14001 elements covered under audit of corporate, business unit, division, or department level operational and emergency control framework:

- Section 4.3.2 Legal and Other Requirements because certain operational and emergency control procedures identify and provide access to applicable legal and other requirements
- Section 4.3.4 Environmental Management Program(s) if the operational or emergency response controls govern the implementation of specific EM programs
- Section 4.4.2 Training, Awareness, and Competence in terms of those responsible for developing and maintaining operational and emergency control frameworks and in terms of those responsible for implementing control requirements
- at an operational and emergency control implementation level
- Section 4.4.3 Communication part a) in terms of communication between the following:
    - Staff responsible for adhering to operational and emergency control requirement and Department Managers
    - Department Managers and Managers responsible for the development and maintenance of non-core operational controls
    - Department Managers and Division Managers
    - Department Managers and Business Unit Core Operational and Emergency Control Lead Personnel
    - Business Unit and Corporate Core Operational and Emergency Control Leads
    - Law Department Experts and Core and Non-Core Operational and Emergency Control Leads
    - Corporate Core Operational and Emergency Control Leads and the OS&H Department Manager
    - The OS&H Department Manager and the Corporate Safety and Health Committee
    - The OS&H Department Manager and the Safety Management System Review Team
    - Corporate Operational and Emergency Control Leads and the SMS Review Team
- Section 4.4.5 Document Control associated with operational and emergency control related documentation, if applicable
- Section 4.4.6 Operational Control
- Section 4.4.7 Emergency Preparedness and Response
- Section 4.5.1 Monitoring and Measurement for operational and emergency control frameworks
- Section 4.5.2 Nonconformance and Corrective and Preventive Action related to operational and emergency control frameworks through review and communication forums (e.g. business plan reviews, SMS and EMS review processes, Corporate Safety and Health Committee review process, reviews

related to specific EMS or SMS programs, reviews related to specific non-core operational controls…etc.)

- Section 4.5.3 Records linked to specific operational or emergency control, if applicable
- Section 4.6 Management Review in terms of the consideration of performance information on operational and emergency control frameworks as an input to the process

Table D4: Rationale for potential auditees with environmental regulatory compliance issue or control framework as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of Environmental Regulatory Compliance Control Framework or Issue	Rationale for Auditing Personnel or Management (i.e. Auditee Responsibilities)
Corporate Environmental Performance and EMS Coordinator	- Maintains awareness of environment related regulatory compliance frameworks throughout the Corporation - Directs the development and dissemination of the "Guide to Environmental Legislation" - Maintains awareness on certain regulatory compliance issues including the number of regulatory citations received by the Corporation, major non-compliance incidents, and changing legislation - May be responsible for providing Corporate EMRC and Executive Management Committee with corporate regulatory compliance performance information
Corporate EMRC Representatives	- Conduct corporate level EMS management review process that may consider performance related to environmental regulatory compliance control frameworks or environmental regulatory compliance issues - May recommend action related to regulatory compliance controls or issue
Business Unit Environmental Performance and EMS Coordinators	- Maintain awareness of environmental regulatory compliance frameworks throughout their business unit - Maintains awareness on regulatory compliance issues including the number of citations received within their business unit, major non-compliance incidents, and performance related to regulatory compliance frameworks - May be responsible for providing Corporate Environmental Performance and EMS Coordinator with business unit level regulatory compliance performance information
Business Unit EMS Management Review Team Representatives	- Conduct business unit EMS management review process that may consider performance related to environmental regulatory compliance control frameworks or regulatory compliance issues - May recommend action related to regulatory compliance control or issue

Table D4: Continued

OS&H Department Manager	- Maintains awareness of the performance of environment related regulatory compliance frameworks that could also be considered core operational or emergency response control frameworks - Responsible for collecting EPM data and information, providing some analysis, and preparing report for Corporate Safety and Health Committee on corporate safety and health management performance that may cover certain regulatory compliance issues and the effectiveness of regulatory compliance control frameworks (or core operational and emergency control frameworks) under the scope of the Occupational Health and Safety Department - Provides Corporate Safety and Health Committee with recommendations on action related to corporate level safety and health objectives, targets, programs and management control frameworks including certain regulatory compliance control frameworks - Provides input to SMS review process
Business Unit Core Operational or Emergency Control Leads	- Have specific responsibilities related to the implementation and maintenance of assigned operational or emergency control frameworks that could also be considered regulatory compliance control frameworks - Provide advisement on assigned operational or emergency control field throughout business units - Maintain awareness of performance related to assigned operational or emergency control field and may communicate maintenance requirements to applicable Department Managers
Non-Core Operational Control Leads	- Responsible for the development and maintenance of operational control documentation and frameworks for non-core operational controls that apply to specific functional activities and could also be considered as control frameworks for environment related regulatory compliance - May be at any level of the Corporation, but may or may not have directive authority in terms of operational control implementation - Perform similar duties to Corporate Core Operational Control Leads, but reporting to different level or have authority to direct action

Table D4: Continued

Corporate Core Operational or Emergency Control Leads	- Responsible for the maintenance of operational and emergency control protocol documentation that are linked with core regulatory compliance frameworks - Maintain liaison with external experts and regulators on their assigned regulatory compliance field that could also be considered an operational or emergency control field - Responsible for analyzing performance information related to assigned regulatory compliance field and providing OS&H Department Manager with performance information - No directive authority, but responsible for providing recommendations and advisement on actions related to assigned regulatory compliance field to OS&H Department Manager - May be responsible for periodically testing assigned regulatory compliance control framework - Provide input to SMS review process
Safety Management System Review Team Representatives	- Responsible for reviewing, developing and maintaining the SMS measurement or self-assessment scheme for operational and emergency control frameworks that could also be considered regulatory compliance control frameworks - Receive input from OS&H Department personnel including the Department Manager and Corporate Core Operational Control Leads
Law Department Experts	- Support Operational and Emergency Control Leads with advisement on environmental legislation and regulation
Executive Management Committee Representatives (e.g. Business Unit Vice-Presidents)	- May be responsible for directing action related to the implementation and maintenance of regulatory compliance control frameworks - May plan and direct the implementation of corrective or preventive actions related to regulatory non-compliances
Division Managers	- Maintain awareness of operational control and emergency response protocols that guide the activities under their scope of management - Maintain awareness of environmental legislations that govern activities under their scope of management and associated control frameworks to assure compliance to such legislations - Maintain awareness of regulatory compliance issues under their scope of management - May be responsible for planning and directing the implementation of corrective or preventive actions related to regulatory non-compliances

Table D4: Continued

Department Managers	- Responsible for communicating regulatory compliance requirements and associated controls to employees under their scope of management - Directs employee actions related to the implementation of environment related control frameworks - Collect EPM data and information, and provides feedback to the applicable lead personnel on the effectiveness and implementation of environment related regulatory compliance control frameworks - Maintain emergency response plans - May plan and direct the implementation of corrective and preventive actions related to regulatory non-compliances
Staff Responsible for Liaising with Regulators and Externally Reporting Compliance Performance	- May be at any level of the Corporation - Depending on legislated submission requirements, responsible for collecting and reporting EPM data and information on compliance performance for regulators - Responsible for maintaining Corporation's relationship with regulators
Staff Responsible for Adhering to Regulatory Compliance Control Frameworks	- In performing operational duties, responsible for complying to applicable environment related regulations by adhering to control framework requirements - Maintain awareness of the controls in place that guide their operational duties - May perform result-based EPM related to the implementation and effectiveness of regulatory compliance control frameworks - May report EPM data and information on the implementation and effectiveness of operational controls and emergency to Department Managers or to applicable lead personnel

Suggestions on what is key to assess in the internal EMS audit of corporate, business unit, division, or department level regulatory compliance issues or control frameworks:

- Has a procedure been established and maintained to identify and have access to applicable legal and other requirements to which the company subscribes
- Are operational controls based on regulatory compliance established according to ISO 14001 criteria
- Are emergency preparedness and response procedures based on regulatory compliance established according to ISO 14001 criteria
- Are Division and Department Managers aware of the regulatory compliance controls applicable to their area of management
- Are Department Managers communicating regulatory compliance requirements and expectations to their staff
- Are staff aware of control requirements that guide their operational duties, and are staff adhering to these requirements in performing their responsibilities (note that responsibilities may include the implementation of EM programs)
- Are measurement mechanisms in place for monitoring and measuring the performance of regulatory compliance controls
- Have the appropriate lines of communication been defined and followed between Law Department Experts, Corporate Core Operational and Emergency Control Leads, Business Unit Core Operational and Emergency Control Leads, Non-Core Operational Control Leads, Department Managers, Division

Managers, staff responsible for implementing regulatory compliance control procedures and requirements, and staff responsible for liaising with and reporting on regulatory compliance performance to regulators

- Has information on regulatory compliance issues and incidents been communicated through the appropriate lines of communication and is the information consistent at the applicable levels
- Are regulatory compliance control frameworks being maintained at the applicable levels (e.g. Are Corporate Core Operational Control Leads receiving EPM data and information on the effectiveness and implementation of assigned controls, analyzing, and using such information in preparing recommendations and modifying associated documentation)
- Is EPM data and information on compliance and on the implementation and effectiveness of regulatory compliance controls consistent at the applicable levels (e.g. Is the EPM data and information at division levels consistent with data and information received at the Business Unit Vice-President level)
- Is EPM data and information on compliance consistent internally and externally (e.g. consistency between regulator data and internal data)
- Are there mechanisms in place to review compliance and the effectiveness and implementation of regulatory compliance control frameworks, and are these mechanisms leading to the development of corrective and preventive actions
- Are corrective and preventive actions on regulatory compliance control frameworks being directed and implemented according to applicable criteria defined in action plans and through consultation with relevant internal scope determination sources (note that this may overlap with maintenance of regulatory compliance control frameworks)
- Are regulatory compliance related documentation and records being controlled according to ISO 14001 criteria
- Is staff responsible for adhering to regulatory compliance control requirements competent to do so on the basis of training, education and experience
- Are lead personnel responsible for developing and maintaining regulatory compliance controls competent to do so on the basis of training, education and experience

ISO 14001 elements covered under audit of corporate, business unit, division, or department level operational and emergency control framework:

- Section 4.3.2 Legal and Other Requirements
- Section 4.3.4 Environmental Management Programs if the regulatory compliance controls govern the implementation of specific EM programs
- Section 4.4.2 Training, Awareness, and Competence in terms of those responsible for developing and maintaining regulatory compliance controls and in terms of those responsible for implementing regulatory compliance control requirements
- Section 4.4.3 Communication part a) in terms of communication between the following:
    - Staff responsible for adhering to regulatory compliance control requirements and Department Managers
    - Staff responsible for adhering to regulatory compliance control requirements and Lead EPM Personnel for control framework
    - Department Managers and Managers responsible for the development and maintenance of non-core operational controls
    - Department Managers and Division Managers
    - Department Managers and Business Unit Core Operational and Emergency Control Lead Personnel
    - Business Unit and Corporate Core Operational and Emergency Control Leads
    - Law Department Experts and Core and Non-Core Operational and Emergency Control Leads
    - Corporate Core Operational and Emergency Control Leads and the OS&H Department Manager
    - The OS&H Department Manager and the Corporate Safety and Health Committee
    - The OS&H Department Manager and the Safety Management System Review Team
    - Corporate Operational and Emergency Control Leads and the SMS Review Team

    - Staff responsible for liaising with regulators and external regulators
- Section 4.4.3 Communication part b) if compliance issue stems from communications with external interested parties
- Section 4.4.5 Document Control associated with regulatory compliance related documentation, if applicable
- Section 4.4.6 Operational Control
- Section 4.4.7 Emergency Preparedness and Response
- Section 4.5.1 Monitoring and Measurement for regulatory compliance control frameworks
- Section 4.5.2 Nonconformance and Corrective and Preventive Action related to regulatory compliance
- Section 4.5.3 Records linked to regulatory compliance
- Section 4.6 Management Review in terms of the consideration of regulatory compliance performance and the effectiveness of compliance control frameworks as an input to the process

Table D5: Rationale for potential auditees with emerging EM risk, opportunity or issue as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of Emerging Risk, Opportunity or Issue	Rationale for Auditing Personnel or Management (i.e. Auditee Responsibilities)
Corporate Environmental Performance and EMS Coordinator	- Maintains awareness on emerging issues and risks affecting the operation of the Company's EMS(s) - Considers such information in proposing corporate level environmental objectives - May be responsible for providing Corporate EMRC and Executive Management Committee with information and recommendations related to emerging risks, opportunities and issues affecting the EMS(s)
Business Unit Environmental Performance and EMS Coordinators	- Maintain awareness on emerging issues and risks affecting the operation of their business unit's EMS - Consider such information in proposing business unit level environmental objectives - May be responsible for providing information related to emerging risks, opportunities and issues affecting the business unit EMS to the applicable Business Unit EMS Management Review Committee
Corporate Core Operational or Emergency Control Leads	- May be responsible for maintaining relationships with regulators and external experts on assigned operational or emergency control fields - May be responsible for internally communicating information on emerging risks, opportunities and issues
OS&H Department Manager	- Maintains awareness on emerging issues and risks affecting OS&H management that may be linked to EM throughout the Corporation - May be responsible for providing information on emerging opportunities, risks or issues affecting the EMS to the Corporate Environmental Performance and EMS Coordinator - May be responsible for providing information and recommendations on emerging risks, opportunities and issues to the Corporate Health and Safety Committee and to the Executive Management Committee
Non-Core Operational Control Leads	- May be responsible for maintaining relationships with regulators and external experts on assigned operational control fields - May be responsible for internally communicating information on emerging risks, opportunities or issues
Personnel Responsible for Maintaining Awareness of and Internally Communicating Emerging Risks or Issues	- Depending on the risk or issue, may be at any level of the Corporation - Responsible for obtaining and communicating information on emerging risks, opportunities or issues to the appropriate level of the Corporation

Table D5: Continued

Executive Management Committee Representatives (e.g. Business Unit Vice-Presidents)	- With input from the Corporate Environmental Performance and EMS Coordinator, from the OS&H Department Manager, and from other relevant internal sources, maintain awareness of emerging risks, opportunities and issues affecting the operation of the Company's EMS(s) - May be responsible for approving and directing response action related to emerging risk, opportunity or issue
Corporate EMRC Representatives	- Perform the Corporate level EMS management review process that considers emerging risks, opportunities and issues affecting the overall corporate EMS - May recommend response action to Executive Management Committee related to emerging risk, opportunity or issue
Business Unit EMS Management Review Team Representatives	- Perform business unit level EMS management review process that considers emerging risks, opportunities and issues affecting the operation of the business unit EMS - May recommend response action to Business Unit Vice-President related to emerging risk, opportunity or issue
Personnel Responsible for Acting on Emerging Risks, Opportunities, or Issues	- Responsible for implementing response action related to emerging risk, opportunity or issue - Depending on issue, may be at any level of the Corporation - May be responsible for collecting and communicating EPM data and information related to the performance of response action

Suggestions on what is key to assess in the internal EMS audit of corporate, business unit, division, or department level emerging risks, opportunities, or issues affecting the operation of the Corporation's EMS(s):

- Does the process for setting environmental objectives and targets consider emerging risks, opportunities and issues
- Have the appropriate lines of communication been defined and followed between the Corporate Environmental Performance and EMS Coordinator, Business Unit Environmental Performance and EMS Coordinators, the OS&H Department Manager, Corporate Core Operational and Emergency Control Leads, Non-Core Operational Control Leads, the Executive Management Committee, the Corporate EMRC, the Corporate Health and Safety Committee, business unit EMS management review teams, personnel responsible for maintaining awareness of and internally communicating emerging risks or issues, personnel responsible for acting on emerging risks, opportunities or issues, and external interested parties
- Has information on emerging risks, opportunities and issues been communicated through the appropriate lines of communication and is the information consistent at the applicable levels
- Are business plan and EMS management review forums considering emerging risks, opportunities and issues, and are such review forums leading to the development of response action
- Are measurement mechanisms in place to monitor and measure the performance of response action related to emerging risks, opportunities or issues
- Are response actions being carried out according to defined requirements and action plans
- Is EPM data and information on response action consistent at the applicable levels

- Is EPM data and information on response action consistent internally and externally (e.g. consistency between regulator data and internal data)
- Is staff responsible for acting on emerging risks, opportunities or issues competent to do so on the basis of appropriate training, education and experience

ISO 14001 elements covered under audit of corporate, business unit, division, or department level operational and emergency control framework:

- Section 4.3.3 Objectives and Targets in terms of consideration of emerging risks, opportunities and issues
- Section 4.3.4 Environmental Management Programs if emerging risk, opportunity or issue affects the implementation of EM program(s)
- Section 4.4.2 Training, Awareness, and Competence in terms of those responsible for implementing response actions related to emerging risks, opportunities and/or issues
- Section 4.4.3 Communication part a) in terms of communication between the following (Note that this is dependent on the nature of the emerging risk, opportunity or issue):
    - Corporate and Business Unit Environmental Performance and EMS Coordinators
    - Corporate Environmental Performance and EMS Coordinator and the Corporate EMRC
    - Corporate Environmental Performance and EMS Coordinator and the Executive Management Committee
    - OS&H Department Manager and the Corporate Environmental Performance and EMS Coordinator
    - OS&H Department Manager and Corporate Core Operational and Emergency Control Leads
    - OS&H Department Manager and Corporate Safety and Health Committee
    - OS&H Department Manager and the Executive Management Committee
    - Business Unit Vice-Presidents and Division Managers
    - Department and Division Managers
    - Business Unit Environmental Performance and EMS Coordinators and Non-Core Operational Control Leads
    - Non-Core Operational Control Leads and Department Managers
    - Non-Core Operational Control Leads and higher level management, if applicable
    - Business Unit Environmental Performance and EMS Coordinators and business unit EMS management review team
    - Business Unit Environmental Performance and EMS Coordinators and business unit business plan review team
    - Personnel responsible for maintaining awareness of and internally communicating information on emerging risks or issues and personnel responsible for directing related action (Note that this may involve the Public Affairs Division if emerging risk, issue or opportunity stems from public liaison)
    - Department or Division Managers (i.e. personnel responsible for directing action) and personnel responsible for acting on emerging risks, opportunities and/or issues
- Section 4.4.3 Communication part b) if emerging risk, opportunity or issue stems from communications with external interested parties
- Section 4.4.6 Operational Control if emerging risk, opportunity and/or issue is related
- Section 4.4.7 Emergency Preparedness and Response if emerging risk, opportunity and/or issue is related
- Section 4.5.1 Monitoring and Measurement for response action related to emerging risk, opportunity and/or issue
- Section 4.5.2 Nonconformance and Corrective and Preventive Action related to emerging risk, opportunity and/or issue
- Section 4.6 Management Review in terms of the consideration of emerging risks, opportunities and/or issues

Table D6: Rationale for potential auditees with EMS management review process as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of EMS Review Process	Rationale for Auditing Personnel or Management (i.e. Auditee Responsibilities)
Corporate Environmental Performance and EMS Coordinator	- Maintains awareness of corporate level EMS related performance - Information provider to corporate level EMS management review process
Business Unit Environmental Performance and EMS Coordinators	- Maintains awareness of business unit level EMS related performance - Information provider to business unit level EMS management review process
Corporate EMRC Representatives	- Conduct the corporate level EMS management review process - Provide recommendations to the Executive Management Committee on EMS related action
Executive Management Committee Representatives	- Responsible for reviewing corporate EMS management review process recommendations and providing approval, if applicable - May be responsible for directing corporate level action related to the EMS
Business Unit EMS Management Review Team Representatives	- Perform business unit level EMS management review process - Comprises Division Managers and Business Unit Environmental Performance and EMS Coordinator - Responsible for recommending business unit EMS related action to the Business Unit Vice-President
Business Unit Vice-Presidents	- Responsible for reviewing business unit EMS management review process recommendations and providing approval, if applicable - May be responsible for directing business unit level action related to the EMS
Division Managers	- Responsible for updating Environmental Performance and EMS Coordinator on division level environmental objectives, targets and programs - Partake in business unit EMS management review process - May be assigned responsibility for directing implementation of corrective or preventive action stemming from EMS management review processes
Lead EPM Representatives for Corporate Strategic Plan	- Provide Corporate Environmental Performance Coordinator with EPM data and information for corporate level objectives and targets - Perform EPM data collection, communication, and some analysis

Table D6: Continued

Lead EPM Representatives for Business Unit Business Plans	- Provides EPM data and information to the Business Unit Environmental Performance and EMS Coordinator - May fall under a division, department or individual staff level - May be associated with the implementation of specific environmental program or operational control framework (e.g. Could be the Manager of a specific program or could be a Business Unit Core Operational Control Lead)
Department Managers	- Provides updates on department environmental objectives, targets and programs to the Division Manager - May be assigned responsibility for directing implementation of corrective or preventive action stemming from EMS management review processes
Staff Responsible for the Implementation of Corrective and Preventive Actions Stemming from EMS Management Review Processes	- Assigned responsibility for implementing corrective and/or preventive actions stemming from EMS management review processes - May be responsible for physically measuring specific EPM data - Provide EPM data and information to the Department Manager and to other Lead Representatives for EPM at different levels and/or in different business areas, as applicable

Suggestions on what is key to assess in the internal EMS audit of corporate or business unit level EMS management review processes:

- Are the EMS management review processes being undertaken according to the criteria defined in the ISO 14001 standard
- Is EPM data and information being analyzed by the Corporate and Business Unit Environmental Performance and EMS Coordinators, and is environmental performance information being communicated as an input to the EMS management review forums
- Have the appropriate lines of communication been established and followed between the Executive Management Committee, the Corporate EMRC, the Corporate Environmental Performance and EMS Coordinator, Business Unit Environmental Performance and EMS Coordinators, Lead EPM Personnel, Business Unit Vice-Presidents, Division Managers, Department Managers and staff
- Is environmental performance data and information consistent at the applicable levels
- Are staff responsible for implementing corrective and preventive actions stemming from management review processes competent to do so on the basis of appropriate training, education and/or experience
- Are EMS management review processes leading to the identification of risk areas and the development corrective and preventive actions related to the operation of the EMS(s)
- Are corrective and preventive actions been implemented according to defined criteria and controls

ISO 14001 elements that can be covered under an internal audit of corporate, business unit, division or department BP processes:

- Section 4.2 Environmental Policy (possible need for change considered as an input to the EMS management review processes)
- Section 4.3.1 Environmental Aspects (considered in the EMS management review processes)
- Section 4.3.2 Legal and Other Requirements (considered in the EMS management review processes)

- Section 4.3.3 Objectives and Targets (considered in the EMS management review process)
- Section 4.3.4 Environmental Management Program(s) (considered in the EMS management review processes)
- Section 4.4.1 Structure and Responsibility
- Section 4.4.2 Training, Awareness, and Competence in terms of personnel responsible for implementing specific corrective or preventive actions stemming from EMS management review processes
- Section 4.4.3 Communication part a) in terms of communication between the following:
    - Corporate and Business Unit Environmental Performance and EMS Coordinators
    - Corporate Environmental Performance and EMS Coordinator and Lead Measurement Representatives for the Corporate Strategic Plan
    - Corporate Environmental Performance and EMS Coordinator and the Corporate EMRC
    - Corporate EMRC and the Executive Management Committee
    - Business Unit Environmental Performance and EMS Coordinators and Lead EPM Personnel for business unit business plans
    - Business Unit Environmental Performance and EMS Coordinators and Division Managers
    - Business Unit Environmental Performance and EMS Coordinators and the applicable Business Unit EMS Management Review Team
    - Lead EPM Personnel for the business unit business plans and staff responsible for physical EPM and the implementation of specific environmental programs
    - Lead EPM Personnel at different levels
    - Department Managers and staff responsible for physical EPM and the implementation of specific environmental programs
    - Division and Department Managers
    - Staff responsible for the implementation of corrective and/or preventive actions stemming from EMS management review processes and higher level management, if applicable
- Section 4.4.3 Communication part b) if communication from external interested parties affects the operation of the Corporation's EMS(s) and is considered in the EMS management review processes
- Section 4.4.4 Environmental Management System Documentation (consideration)
- Section 4.4.5 Document Control (consideration)
- Section 4.4.6 Operational Control (consideration)
- Section 4.4.7 Emergency Preparedness and Response (consideration)
- Section 4.5.1 Monitoring and Measurement in terms of process consideration and in terms of EPM data and information input to EMS management review process
- Section 4.5.2 Nonconformance and Corrective and Preventive Action as an output of the EMS management review processes
- Section 4.5.3 Records related to the EMS management review processes
- Section 4.5.4 Environmental Management System Audit part b)
- Section 4.6 Management Review

Table D7: Rationale for potential auditees with EMS audit follow-up as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of EMS Audit Follow-up Action	Rationale for Auditing Personnel or Management (i.e. Auditee Responsibilities)
Corporate Environmental Performance and EMS Coordinator	- Maintains awareness of EMS audit findings - Maintains awareness of the status of EMS audit follow-up actions
Business Unit Environmental Performance and EMS Coordinators	- Maintains awareness of business unit EMS audit findings - Maintains awareness of the status of business unit EMS audit follow-up actions
Corporate EMRC Representatives	- Review corporate EMS audit reports - Provide recommendations on corporate level EMS audit follow-up action to the Executive Committee
Executive Management Committee Representatives	- Responsible for reviewing corporate EMS audit reports - Responsible for reviewing Corporate EMRC recommendations on follow-up action and providing approval, if applicable - May be responsible for planning and directing corporate level EMS audit follow-up action
Business Unit EMS Management Review Team Representatives	- Responsible for reviewing business unit EMS audit reports - Provide recommendations on business unit level EMS audit follow-up action to the Business Unit Vice-President
Business Unit Vice-Presidents	- Responsible for reviewing business unit EMS audit reports - Responsible for reviewing Business Unit EMS Management Review Team recommendations on follow-up action and providing approval, if applicable - May be responsible for planning and directing business unit level EMS audit follow-up action
Personnel Responsible for the Implementation of EMS Audit Follow-up Action and Associated EPM Activities	- May be at any level of the Corporation - Responsible for implementing or directing the implementation of EMS audit follow-up action according to defined action plans - Responsible for reporting EPM data and information on the status and performance of EMS audit follow-up action to the applicable management level and to Business Unit or Corporate Environmental Performance and EMS Coordinators (Note that there may be separate personnel responsible for implementation and EPM activities)

Suggestions on what is key to assess in the internal EMS audit of corporate, business unit, division or department level EMS audit follow-up:

- Has information on the results of EMS audits been provided to the appropriate levels of management
- Are EMS audit reports controlled according to the criteria defined in the ISO 14001 standard

- Has information on the results of EMS audits been considered as an input to EMS management review processes
- Has the status of EMS audit follow-up action been considered as an input to EMS management review processes
- Are audit follow-up actions being implemented according to follow-up action plans (i.e. according to defined plans and controls governing the implementation of follow-up action)
- Are personnel responsible for the implementation of EMS audit follow-up action competent to do so on the basis of adequate training, education and experience
- For audit the development and implementation of audit follow-up action, have the appropriate lines of communication been defined and followed between the Lead Internal EMS Auditor, the Executive Management Committee, the Corporate EMRC, the Corporate Environmental Performance and EMS Coordinator, Business Unit Environmental Performance and EMS Coordinators, Business Unit EMS Management Review Teams, and personnel responsible for the implementation of audit follow-up action
- Is EPM data and information on the implementation and effectiveness of audit follow-up action being conveyed at the appropriate levels and through the appropriate lines of communication
- Is EPM data and information on the implementation and effectiveness of audit follow-up action consistent at the appropriate levels

ISO 14001 elements that can be covered under an internal audit of corporate, business unit, division or department level EMS audit follow-up:

- Section 4.3.3 Objectives and Targets if EMS audit follow-up action has led to the development of new environmental objectives and targets
- Section 4.3.4 Environmental Management Program(s) if EMS audit follow-up action involves the development and implementation of EM programs
- Section 4.4.2 Training, Awareness, and Competence in terms of personnel responsible for implementing EMS audit follow-up action
- Section 4.4.3 Communication part a) in terms of communication between the following:
    - Corporate Environmental Performance and EMS Coordinator and the Corporate EMRC
    - Corporate EMRC and the Executive Management Committee
    - Corporate and Business Unit Environmental Performance and EMS Coordinators
    - Business Unit Environmental Performance and EMS Coordinators and the applicable Business Unit EMS Management Review Team
    - Business Unit EMS Management Review Teams and Business Unit Vice-Presidents
    - Staff responsible for the implementation of corrective and/or preventive actions stemming from EMS audits and higher level management, if applicable
    - Staff responsible for the implementation of EMS audit follow-up action and staff responsible for EPM activity for EMS audit follow-up action, if applicable
    - Staff responsible for EPM activities associated with EMS audit follow-up action and Business Unit or Corporate Environmental Performance and EMS Coordinators
- Section 4.4.5 Document Control in terms of EMS audit reports
- Section 4.4.6 Operational Control if the implementation EMS audit follow-up action is governed by specific operational controls
- Section 4.4.7 Emergency Preparedness and Response if the implementation of EMS audit follow-up action is governed by specific emergency preparedness and response controls
- Section 4.5.1 Monitoring and Measurement for EMS audit follow-up action
- Section 4.5.2 Nonconformance and Corrective and Preventive Action as an output of the EMS audits and EMS management review processes
- Section 4.5.3 Records related to the EMS audits
- Section 4.5.4 Environmental Management System Audit part b)
- Section 4.6 Management Review in terms of the development of EMS audit follow-up actions and in terms of the consideration of EMS audit results and the status of audit follow-up actions

Table D8: Rationale for potential auditees with EMS supporting tools or controls as the primary internal EMS audit coverage component

Potential Auditees with EMS Audit Coverage of EMS Supporting Tools or Controls	Rationale for Auditing Personnel or Management (i.e. Auditee Responsibilities)
Personnel Responsible for Developing and Maintaining EMS Supporting Tools and Controls	- Responsible for the development and maintenance of EMS supporting tools and/or controls - Depending on tools or controls, may be at any level of the Corporation - Receive and analyze PM data and information on the effectiveness and implementation of supporting tools and/or controls from personnel responsible for implementing or directing the implementation of the tools and/or controls - May or may not have directive authority in terms of the implementation of EMS supporting tools and/or controls - Responsible for communicating expected conditions of use of EMS supporting tools and/or controls to personnel responsible for directing their implementation
Corporate Environmental Performance and EMS Coordinator	- Maintains awareness of EMS supporting tools and controls - Maintains awareness on the effectiveness of EMS supporting tools and controls
Business Unit Environmental Performance and EMS Coordinators	- Maintains awareness of EMS supporting tools and controls within business unit - Maintains awareness of the effectiveness of EMS supporting tools and controls
Personnel Responsible for Directing the Implementation of EMS Supporting Tools and Controls	- Depending on supporting tool or control, may be at any management level of the Corporation - Responsible for communicating expected conditions of use of EMS supporting tools or controls to personnel responsible for their implementation - May be responsible for communicating performance data and information on the use and effectiveness of EMS supporting tools and/or controls to personnel responsible for their maintenance
Personnel Responsible for Implementing and Using EMS Supporting Tools and Controls	- Depending on supporting tool or control, may be at any level of the Corporation - Responsible for implementing and/or using EMS supporting tools and controls according to expectations defined by those responsible for directing said implementation - Responsible for communicating performance data and information on the use and effectiveness of EMS supporting tools or controls to personnel responsible for directing their implementation

Suggestions on what is key to assess in the internal EMS audit of corporate, business unit, division or department level EMS supporting tools and/or controls:

- Are EMS supporting tools and controls being properly maintained (i.e. is performance data and information on the use and effectiveness of EMS supporting tools and controls being communicated to those responsible for their maintenance, and are those responsible for the maintenance of EMS supporting tools and controls using performance information to improve or modify their assigned tools and/or controls)
- Are EMS supporting tools and controls being implemented according to expected conditions defined by personnel responsible for their development and maintenance
- Are personnel responsible for directing the implementation of EMS supporting tools and controls and staff responsible implementing and using EMS supporting tools and controls aware of the associated requirements
- Have the appropriate lines of communication been defined and followed between personnel responsible for developing and maintaining EMS supporting tools and/or controls, personnel responsible for directing the implementation of EMS supporting tools and/or controls, personnel responsible for implementing and using EMS supporting tools and/or controls, Business Unit Environmental Performance and EMS Coordinators, and the Corporate Environmental Performance and EMS Coordinator
- Is performance information on the use and effectiveness of EMS supporting tools and controls being communicated to the appropriate levels and through the appropriate lines of communication
- Is performance information on the use and effectiveness of EMS supporting tools and controls consistent at the appropriate levels
- Are personnel responsible for implementing EMS supporting tools and/or controls competent to do so on the basis of appropriate training, education and experience
- Are documentation and records associated with EMS supporting tools or controls being controlled according to ISO 14001 criteria

ISO 14001 elements that can be covered under an internal audit of corporate, business unit, division or department level EMS supporting tools and controls:

- Section 4.3.4 Environmental Management Program(s) if EMS program(s) are governed by EMS supporting tools and/or controls
- Section 4.4.2 Training, Awareness, and Competence in terms of personnel responsible for implementing EMS supporting tools and/or controls
- Section 4.4.3 Communication part a) in terms of communication between the following:
    - Personnel responsible for the development and maintenance of EMS supporting tools or controls and personnel responsible for directing the implementation of EMS supporting tools or controls
    - Personnel responsible for the implementation of EMS supporting tools or controls and personnel responsible for directing the implementation of EMS supporting tools or controls
    - Personnel responsible for the development and maintenance of EMS supporting tools or controls and higher level management, if applicable
    - Personnel responsible for the development and maintenance of EMS supporting tools or controls and Corporate or Business Unit Environmental Performance and EMS Coordinators
- Section 4.4.5 Document Control if supporting tools and/or controls have associated controlled documentation
- Section 4.4.6 Operational Control if EMS supporting tools or controls are linked to operational control
- Section 4.4.7 Emergency Preparedness and Response if EMS supporting tools or controls are linked to emergency preparedness and response controls
- Section 4.5.1 Monitoring and Measurement for EMS supporting tools and controls
- Section 4.5.2 Nonconformance and Corrective and Preventive Action in terms of maintenance of EMS supporting tools or controls

- Section 4.5.3 Records related EMS supporting tools or controls

Section 4.6 Management Review in terms of consideration given to the effectiveness and use of EMS supporting tools and controls, if applicable

Appendix E:

Supporting Tables for REIMSAP Model

Table E1: Responsibility Matrix for Auditors, Audit Clients and Audit Program Stakeholders Based on the REIMSAP Process Model

Title or Name of Personnel:	Responsibility as:			
	Auditor	Audit Client	Auditee	Audit Program Stakeholder
Lead Internal EMS Auditor	– Plans internal EMS audit program – Plans and executes individual internal EMS audits – Prepares audit reports and checks or audits the implementation of follow-up action			
Audit Committee of the Board of Directors		– Receive and review audit reports – Make recommendations to or direct the Executive Management Committee, as required – Responsible for representing shareholders and stakeholders of the company		– Independent Board comprising appointed representatives – Interest in EMS auditing as assurance that the energy utility is being managed and operated in an environmentally responsible manner
Internal Audit Review Committee (IARC)		– Receive and review audit reports – Provide final approval on internal EMS audit program plan and on individual internal EMS audit plans – Provide approval on corporate level follow-up action, as required		– IARC comprises the Executive Committee – Executive Management Committee is the authority for corporate level decision making and for managing the energy utility's operations – Interest in EMS auditing to provide assurance that EMS is functioning according to planned arrangements and that employees are adhering to EMS requirements

Table E1: Continued

Corporate Environmental Performance and EMS Coordinator		- Member of and information provider to the Corporate EMRC - Receives and reviews audit reports and proposes corporate level responses to the Corporate EMRC - Internal EMS audit scope, coverage and criteria determination process supplier	- Audited based on functions related to ensuring that the company's EMS requirements are established, maintained, implemented according to ISO 14001 and planned arrangements	- Interest in EMS auditing as a tool to provide assurance that the EMS requirements are established, maintained and implemented in accordance with ISO 14001 and planned arrangements
Corporate Environmental Management Review Committee (EMRC)		- Provides Lead Internal EMS Auditor with audit program parameters - Receives and reviews internal EMS audit program plan, and makes recommendations to the Lead Internal EMS Auditor - Receives and reviews individual internal EMS audit plans, and makes recommendations - Receive and review audit reports - Make recommendations on corporate level follow-up action to the Executive Management Committee	- May be audited to assess the EMS management review process at a corporate level	- Responsible for reviewing the corporate level EMS for suitability, adequacy and effectiveness - Interest in EMS auditing as an input to the corporate level EMS management review process
Employees			- Audited based on responsibility to adhere to EMS requirements	- Interest in EMS auditing as a driver for change and action related to EM throughout the company

Table E1: Continued

Business Unit Environmental Performance and EMS Coordinators			- Audited based on functions related to ensuring that business unit EMS requirements are established, maintained, implemented according to ISO 14001 and planned arrangements - Through the business unit EMS management review process, partake in the development of audit follow-up action, as required	- Interest in EMS auditing as a tool to provide assurance that the business unit EMS requirements are established, maintained and implemented in accordance with ISO 14001 and planned arrangements
Business Unit Vice-Presidents		- Members of IARC	- Provide approval on and direct or delegate the implementation of business unit level EMS audit follow-up action, as required - May be audited based on responsibility and authority for setting business unit level EM direction and managing business unit operations	- Interest in EMS auditing to provide assurance that EMS is functioning according to planned arrangements and that employees are adhering to EMS requirements
External Auditors	- Plan and execute external EMS surveillance and registration audits			- Interested in internal EMS audit to assess requirement under ISO 14001 - Interest in internal EMS audit as a basis for planning external audit scope and coverage

Table E1: Continued

Division Managers			- May be audited based on functions in setting division level EM direction and directing EMS related action within division - May be audited based on responsibilities as an EMS program manager - May plan and direct the implementation of division level audit follow-up action - Provide approval on department level follow-up action plans, as required - As part of the Business Unit EMS Review Committee, partake in the development of business unit EMS audit follow-up action	- Interest in EMS audits because audit findings may indicate a non-conformance or opportunity for improvement under their scope of management - Interest in EMS auditing to provide assurance that EMS within division is functioning according to planned arrangements and that employees are adhering to EMS requirements
Department Managers			- May be audited based on functions related to deploying and directing the implementation of department level EMS requirements and setting department level EM direction - May be audited based on responsibilities as an EMS program manager, if applicable - Plan and direct the implementation of department level audit follow-up action	- Interest in EMS audits because audit findings may indicate a non-conformance or opportunity for improvement under their scope of management - Interest in EMS auditing to provide assurance that EMS within department is functioning according to planned arrangements and that employees are adhering to EMS requirements

Table E2: Analysis of Inputs and Outputs of the REIMSAP Model

Input to Internal EMS Audit Process	Rationale for Input	Output of Internal EMS Audit Process Using Described Input
Corporate EMRC Recommended Audit Program Parameters	– Recommended program parameters provide a means to integrate knowledge gained from the corporate level EMS management review process with audit program planning – Parameters provide a vehicle for audit client input into audit program planning	Internal EMS Audit Program Plan
Scope, Coverage and Criteria Determination Process	– Risk and priority assessment process to optimize audit plans by integrating information gained through result-based EPM and other feedback mechanisms into internal EMS audit planning	Internal EMS Audit Program Plan Internal EMS Audit Plans
Internal EMS Audit Plan	– Plan describing individual internal EMS audit objectives, scope, coverage, criteria and work activities – Plan directing the execution of an internal EMS audit	Internal EMS Audit
Internal EMS Audit	– Execution of an internal EMS audit leading to audit findings, conclusions and recommendations	Draft Internal EMS Audit Report
Draft Internal EMS Audit Report	– Report describing the audit findings, conclusions and recommendations	Audit Follow-up Action Plans
Audit Follow-up Action Plans	– Plans covering actions needed to respond to audit findings, conclusions and recommendations	Final Audit Report
Final Audit Report	– Report describing the audit findings, conclusions, recommendations and follow-up action plans – Becomes an input into the evaluation of audit effectiveness and the scope, coverage and criteria determination process for subsequent EMS audits	Evaluation of Audit Effectiveness Input into SCCD Process for Subsequent EMS Audits
Evaluation of Audit Effectiveness	– Evaluation to assess the extent to which internal EMS audit program objectives have been fulfilled – Evaluation for the purposes of improving internal EMS audits and the internal EMS audit program – Assessment of the implementation of audit follow-up action against planned arrangements – Information gained through evaluation becomes input into scope, coverage and criteria determination process for subsequent EMS audits	Improvements to Internal EMS Audit Program Input into SCCD Process for Subsequent EMS Audits

Appendix F:

Supporting Discussion for REIMSAP Applications

1.0 Strategic Planning Versus BP in an Energy Utility

2.0 Discussion on Management Systems in an Energy Utility

1.0 Strategic Planning Versus BP in an Energy Utility

In an energy utility, there are essentially two categories of planning. First, there is strategic long-range planning. An example of this in the context of energy generation is the forecasting of energy supply and demand. A fully-integrated energy utility will have existing facilities that follow a life-cycle from design and construction to operation to decommissioning. As energy demand increases and existing facilities reach the end of their useful lives, there is a need to develop new facilities and refurbish existing facilities. All of this must be planned so that a timeline is established to direct when future development is needed. Additionally, the nature and location of potential new developments must be planned so that when the time comes for new development, generation as well as site options have been investigated and there is a proactive and diligent approach to development planning.

The second type of planning in an energy utility is BP. BP is short-range and involves the setting of organizational goals, objectives, programs, initiatives, measures, and targets. In essence, it sets direction in the short-term, defines organizational intentions over a set interval, and involves regular review and re-evaluation of plans facilitated through result-based PM. An example of this could be planning for a PCB management program involving the testing of existing transformers and replacement of contaminated transformers. An objective of the business area responsible would be "implement PCB management program". Measures could include "the number of transformers tested over the number of transformers to be tested" and the "number of PCB contaminated transformers replaced over the number of PCB transformers identified to be replaced". At a department level with program implementation responsibility, there would be a detailed program plan as well as a program statement in the business plan. The program or strategic initiative could be defined in the business plan by the statements "continue to test transformers for PCB's" and "continue to replace PCB contaminated transformers".

Long-range and short-range planning are interrelated to a degree. Long-range plans should be revisited and revised at set intervals due to the uncertainties inherent in forecasting. Also, future planning should consider the present. For instance, with the above example of strategic long-range planning, consideration must be given to demand and supply-side management initiatives. Energy saved through public energy conservation initiatives and capacity gained through energy supply enhancement initiatives should both factor into future demand and supply forecasting. Considering demand and supply-side management involves consideration of what is currently being done by the organization. Hence, long-range planning involves consideration of what is being done in the short-term and how it should theoretically affect future development, activity, and priorities. Short-range BP may require consideration of long-range plans. With the above example of BP, longer-range planning may indicate that legislation is being developed for PCBs and PCB contaminated transformers need to be replaced by 2008 to comply with the impending legislation.

EMS related planning falls under the shorter-range BP category. Measurement activity may tie into both between EMS planning and long-range strategic planning. For example, flow forecasting requires hydrometric monitoring at specific locations throughout a watershed. The same measurement data is used to monitor compliance with regulated hydraulic limits. The application of the REIMSAP model relies on the use of result-based EPM information that is driven by BP processes.

2.0 Discussion on Management Systems in an Energy Utility

Each goal under the case utility's Corporate Strategic Plan (CSP) could be perceived as having a management system. There may not be a stand-alone management system for each goal, and there is overlap between the systems to achieve certain goals. Nevertheless, if a corporate goal has been declared for an energy utility, then there should clearly be organizational structures, processes and resources established to support the accomplishment of said goal. It can be concluded that a fully-integrated energy utility will have management systems related to safety, environment, quality, finance, social accountability, recruiting and professional development, corporate citizenship, sustainable development, and energy exporting. With the exception of EM, these management systems are discussed in the following sub-sections.

2.1 Safety Management

Safety management in an energy utility has considerable overlap with EM. System elements for an ISO 14001 EMS can be paralleled with those needed to manage safety and health. An energy utility should have safety and health related policies, safety and health management goals, objectives, targets, programs, monitoring and measurement, documentation, controls, performance and system reviews, training, and auditing. The strongest overlap between safety and health and environmental management relates to programs, controls, monitoring and measurement, auditing, and training. There are standards for safety and health management such as the British Standards Institute's (BSI) OHSAS 18001, 1999; however, a standardized and certifiable SMS is not a requisite for effective safety and health management. In Canada, many energy utilities will customize their safety and health management systems to fit their needs and activities. For example, the case utility has devised an SMS Manual that provides guidelines and requirements that form the foundation of core safety and health initiatives and controls. The SMS Manual also lays out the framework for measurement related to core safety and health controls. The format and content of the SMS Manual was not prescribed and is unique to the case utility.

2.2 Quality Management

Quality in an energy utility refers to quality of service and covers issues such as energy rates, reliability, public safety, and quality of specific services such as electricity outage response. In a fully-integrated energy utility, providing customers with quality energy service engages all business units. Ideally, energy customers should be provided with dependable energy and energy service at reasonable rates, with no outages, and in a manner that protects public safety. In reality, there are uncontrollable forces that lead to energy outages, such as lightning or a falling tree striking a power line. As a result, energy utilities must manage their services to respond to such outages as timely as possible to reduce the impacts of such disruption on customers.

In addition, there are uncontrollable forces of nature that can affect energy rates such as drought. Energy utilities will have systems and processes in place to forecast water conditions for hydro-electric operations. These forecasts are used so that adequate financial reserves can be maintained to protect against the impact of drought, so that importing of energy can be timed accordingly, and to plan for new development needed to meet energy demands and commitments. Lastly, there will also be instances where public safety can be and will be affected by the infrastructure of an energy utility. For instance, a vehicle could potentially collide with a utility pole leading to injury and power outage. An energy utility should have systems and processes in place to minimize the potential for such public contacts and to respond accordingly.

2.3 Economic and Energy Export Management

An energy utility is a service business. With a publicly traded or privately owned energy utility, there should be a drive to provide shareholders with a return on their investment. Finance is a pillar of the

triple bottom line, and as such, an energy utility should have a system in place to set and monitor financial targets and to respond to economic opportunities. Energy exporting ties into financial and economic management in that fully-integrated energy utilities in Canada export energy to generate revenue, to help meet the energy demands of neighboring and other regions, and to maintain low price stability for customers within their primary service region. Maximizing energy exports increases revenue that can be used to provide monetary return to shareholders or return to customers through reduced energy costs. In any event, an energy utility that exports needs to manage exporting, and there should be systems in place for planning and managing export marketing, commitments and customer relations, and transmission.

2.4 Social Accountability and Citizenship Management

Social accountability is another high priority for energy utilities. There is public that has been or will be socially impacted by the existing infrastructure and new developments of an energy utility. To support a positive relation with the public, an energy utility should have management systems in place to manage social relations. There should be social accountability objectives and programs that are aimed at enhancing and supporting relationships with communities and peoples that have sacrificed way of life to help pave the way for existing and new development. For example, a corporate objective related to social accountability could be "increase employment opportunities for socially impacted peoples" or "pursue business relationships with companies in affected communities".

Corporate citizenship overlaps with social accountability in that it is within the best interests of an energy utility to foster mutually beneficial relationships with socially impacted public, as well as with the communities that it services. A large fully-integrated energy utility will have corporate initiatives aimed at supporting community initiatives such as education and community events. Furthermore, there may be initiatives aimed at developing partnerships and relations with businesses and customers to support economic development in the service region. To be a good corporate citizen, an energy utility should have systems in place to manage community related objectives and initiatives that are outside of the primary scope of generating, transmitting and distributing energy.

2.5 Recruiting and Development Management

Recruiting and professional development are important priorities for business growth. Energy utilities require skilled and trained employees. Energy utilities will typically have recruitment policies. Business areas within an energy utility should have professional development plans for individual employees so that skills can be refined and expanded. Furthermore, energy utilities will typically have recruitment targets and objectives related to designated groups. The reason for this stems from external pressures related to labour force perception. An energy utility with a workforce that reflects the demographics of its service region should gain greater public acceptance that one with, for instance, a male dominated workforce. In any case, an energy utility should have a system and processes in place to manage recruitment and succession, to plan for and execute professional development initiatives, and to retain competencies and knowledge capital.

2.6 Sustainability Management

Sustainable development is a major priority that overlaps with EM. It complements commitments related to preventing and minimizing pollution. It also compliments commitments related to social accountability, alternative energy research, demand and supply-side management, and enhancing existing infrastructure. Goals related to sustainable development will typically be accomplished through EM initiatives, research and development, energy conservation programs (i.e. demand-side and supply-side management initiatives), and through social management initiatives (i.e. social accountability programs).

What is noteworthy with sustainability management is that it demonstrates the interdependence between particular management systems. Sustainable development management involves economic, social

and environmental management. In line with these three pillars is management related to internal and external energy conservation. In line with economic and environmental sustainability in the energy industry is the need to export renewable energy to displace GHG emissions and to sustain price stability.

Clearly, there is inherent redundancy and overlap in implementing individual management systems in an energy utility. For example, quality management in an energy utility could involve a process for responding to customer contacts. Depending on the situation, a customer contact may lead to an environment or safety impact. Hence, to respond, there may be processes related to environmental and safety control (e.g. spill or accident response), as well as those needed to ensure continued quality of service (e.g. process to develop actions to minimize the risk of contact or outage re-occurrence). All of the corporate goals discussed are driven by an energy utility's overall business management system.

Appendix G:

Case Utility Analysis Interview Material

University of Alberta
Research Information Sheet

Study Title:
Integration of Management Systems in an Energy Utility: Environmental Management

Research Investigators:

Rob Phernambucq
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Phone: (204) 256-7725

Stanislav (Stan) Karapetrovic
Department of Mechanical Engineering
University of Alberta
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(780) 492-9734

Research Description:

Hello. My name is Rob Phernambucq. I am conducting a study on how to use organizational performance measurement, specifically environmental system- and result-based measurement, in the integration of management systems in an energy utility. This research is a part of my master of science in engineering management work in the Department of Mechanical Engineering at the University of Alberta. The purpose of the study is to improve the planning and reporting of the environmental management system and to examine the possibility of the integration of this system with other management systems. As a part of this study, I will be conducting interviews to better understand the current measurement and management processes within the Case Utility, as they pertain to environmental management. The interviews will be conducted with the assistance of a structured questionnaire. You are under no obligation to participate in this study. The participation is completely voluntary. You can refuse to participate at any time before or during the interview. If you refuse to participate, any data collected from your interview will be destroyed immediately after your refusal to participate. If you decide to participate, the data sheets from the interview will be coded with a non-personally identifiable code. You will be asked to sign the consent form (back side). Your signature on the consent form will constitute your consent to participate in this study. Your name will not appear in any documents, reports, research papers or the thesis stemming from the interview. The code sheet will be kept in a locked drawer accessible to me only for the duration of the study (until December 2003), and then transferred to the University of Alberta, where it will be kept locked in Dr. Karapetrovic's office for a period of one year after the last publication from this study has been published. If you have any questions regarding this study, please do not hesitate to contact me, or the study coordinator Dr. Stanislav Karapetrovic. Any questions regarding the ethical considerations in conjunction with this study should be directed to Dr. John Whittaker, Chair of the Faculty of Engineering Research Ethics Board, Department of Mechanical Engineering, University of Alberta, Edmonton, Alberta, T6G 2G8, John.Whittaker@ualberta.ca, (780) 492-4443.

University of Alberta
Research Interview Consent Form

Part 1 (to be completed by the Principal Investigator)

Title of Project: Integration of Management Systems: Environmental Management

Principal Investigator(s): Rob Phernambucq and Stanislav Karapetrovic

Co-Investigator(s):

Include affiliation(s) and phone number(s):
Department of Mechanical Engineering, University of Alberta
T6G 2G8 Edmonton, AB (780) 492-9734

Part 2 (to be completed by the Research Participant)

Do you understand that you have been asked to be in a research study?	Yes	No
Have you read and received a copy of the attached Information Sheet	Yes	No
Do you understand the benefits and risks involved in taking part in this research study?	Yes	No
Have you had an opportunity to ask questions and discuss this study?	Yes	No
Do you understand that you are free to refuse to participate, or to withdraw from the study at any time, without consequence, and that your information will be withdrawn at your request?	Yes	No
Has the issue of confidentiality been explained to you? Do you understand who will have access to your information?	Yes	No

This study was explained to me by: _____

I agree to take part in this study:

_____ _____ _____
Signature of Research Participant Date Witness

_____ _____
Printed Name Printed Name

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

_____ _____
Signature of Investigator or Designee Date

THE INFORMATION SHEET MUST BE ATTACHED TO THIS CONSENT FORM AND A COPY OF BOTH THE FORM AND THE INFORMATION SHEET MUST BE LEFT WITH THE RESEARCH PARTICIPANT.

University of Alberta
Research Ethics Committee

Application for Study Approval

Student: Rob Phernambucq	**Faculty:** Stanislav Karapetrovic

Study Title:
Integration of Management Systems in an Energy Utility: Environmental Management

Study Description:

As a part of the research on his M.Sc. thesis regarding the integration of management systems in an energy utility, Mr. Rob Phernambucq, an M.Sc. (Engineering Management) student in the Department of Mechanical Engineering, will perform a study on system- and indicator-based performance measurement focused on the environment. The study will be conducted from May to December 2003 in the Corporate Planning Division of the Case Utility. The study consists of the following three phases:

- Mr. Phernambucq performs an analysis of the current organizational performance measurement frameworks at the corporate level of the case utility through a study of the relevant documentation and interviews with the employees from the Corporate Planning Division and the managers from other appropriate divisions of the company. To facilitate this analysis, Mr. Phernambucq designs a questionnaire that will be used in gathering information about the processes of measuring and managing environmental performance. An example of a questionnaire that will be used is provided in Appendix A of this application.
- Mr. Phernambucq administers the questionnaires in an interview setting. Informed consent is asked from all participants at the time of the interview. The participants are also informed that the participation in the study is completely voluntary and anonymous, and that the purpose of the study is to better understand the current organizational performance measurement and management processes, and to recommend the opportunities for improvement. The voluntary nature of the interview is assured by making a statement that the participant can refuse to participate at any time before or during the interview, and that such a decision will bear no negative consequences for the participant. The anonymity is assured by coding the interview data sheets with a non-personally identifiable code. Therefore, no individual-specific information gathered from the interviews will appear in the thesis and/or any reports provided to the company or being publicly available.
- Mr. Phernambucq collects the data, provides an analysis of the current system and recommends an integrative model. The implementation of the proposed model is outside of the scope of this study.

Study Benefits:

This study is aimed at improving the integration of management systems in a non-traditional (non-manufacturing) setting. The expected benefits for the company include an improved understanding of the current status of the environmental management system, an exploration of existing and potential linkages among separate management systems, provision of operational models that can be used to simulate and measure performance, and the illustration of the potential benefits of implementing integrated management systems. The researchers benefit from the development of a new integrated management system model for energy utilities, focusing on performance measurement, and the ability to analyze the proposed model in a real-life setting.

Study Risks:

No specific risks to people are expected from this research study.

Ethical Considerations:

Informed consent:

The consent will be asked from all participants before the interview, by reading the statement enclosed in Appendix B of this application, and by posting Appendix B on the company's bulletin boards or signing the consent form in Appendix B. Participation in the study is completely voluntary, and anonymity is assured. The provision of answers to the questions in an interview or the signature on the consent form will constitute participant consent.

Anonymity:

The anonymity is assured by coding the interview data sheets with a non-personally identifiable code. The code sheet will be kept in a locked drawer accessible to Mr. Phernambucq only for the duration of the study, and then transferred to the University of Alberta, where it will be kept locked in Dr. Karapetrovic's office.

Other aspects:

No deception and/or concealment will be deployed in this research. No potentially hazardous equipment and/or material will be used in this research.

Appendix H:

Supporting Discussion for the Case Utility Analysis

1.0 Expanded Discussion on Case Utility Background

2.0 Expanded Discussion on Case Utility Result-Based EPM Processes

3.0 Expanded Discussion on Case Utility System-Based EPM Processes

4.0 Discussion on Case Applicability to Proposed Result-Based EPM Network Structure and Process Models

5.0 Description of Inefficiencies Related to SMS Measurement System

6.0 Discussion on Case Utility EPR Practices

1.0 Expanded Discussion on the Case Utility Background

The case utility's mission statement includes a commitment to the continued provision of an energy supply adequate to the demand of the province and to the provision and marketing of energy products and services within and outside of the province. To accomplish its mission, the case utility is faced with the following key challenges:

- Continuing to operate and maintain existing facilities and systems in order to provide reliable energy service.
- Managing relations with stakeholders including customers, regulators, the general public, and those impacted by company operations and infrastructure.
- Seeking out new developments, such as alternative energy generation, to expand operations and better serve customers and the environment.
- Preparing for new developments and relations to expand operations in terms of generation and transmission capacity.
- Improving systems and practices to improve the quality of services and products being delivered and to strengthen operational management.

The case utility is a member of the CEA's ECR Program. Accordingly, it achieved corporate and business unit level ISO 14001, 1996, registrations in 2002. Currently, the business unit level registration covers one EMS for the Energy Supply Business Unit and one EMS for T&D and CS&M Business Units. T&D and CS&M Business Units were lumped under one EMS due to similarities in their environmental aspects. Originally, only facilities were registered to ISO 14001; however, facilities are now recognized under the Energy Supply business unit registration. The case utility's EMSs are set-up as an umbrella system with the corporate level EMS providing the core framework for EM throughout the corporation. The business unit level EMSs cover business unit specific requirements, processes and controls. As the EMSs mature, the case utility is leaning towards having a single EMS registration for the entire corporation.

The case utility's activities are regulated by numerous Federal and Provincial Acts geared towards the enhancement and protection of environmental quality. The implementation of environmental acts is facilitated by regulations, objectives, guidelines, standards, and codes of practice that serve as measures of control to ensure compliance and adherence to acceptable limits. The case utility's EMSs were developed partly as a tool to provide a systematic approach in the management of environmental aspects and regulatory compliance.

2.0 Expanded Discussion on Case Utility Result-Based EPM Processes

2.1 BP Processes

The setting of the case utility's environmental policy, objectives, targets and programs is driven by BP processes. The case utility publishes an annual Corporate Strategic Plan (CSP) that defines the corporate level vision, mission and goal statements. The CSP breaks down each goal into a series of associated strategic objectives, actions, measures and targets. The current CSP includes goals related to customer service quality and value, enhancing aboriginal relations, improving financial position, improving safety, maximizing export revenue, having capable and diverse employees to reflect the demographics of the province, corporate citizenship, supporting business development in the province, supporting energy conservation and alternative energy programs, and protecting the environment.

The environmental protection goal section of the CSP is supported by seven corporate level strategic objectives, three measures, and three targets. Two of the corporate environmental measures and associated targets are based on environmental components of public or customer surveys. The other measure and target relates to net greenhouse gas emissions.

The CSP is deployed throughout the company through business unit, division and department level BP. The corporate environmental goal is consistent across all business unit business plans. The business plans throughout the corporation define environmental objectives, actions, measures and targets at the level applicable to the business plan. With the exception of the CSP, the business plans also highlight the deployment of environmental objectives, actions and programs in terms of the business areas or personnel responsible. Environmental objectives, deployable actions and EM programs defined in certain business plans do not all have associated performance measures and targets. This is consistent with ISO 14001, as the linking of all environmental objectives, actions and programs with environmental measures and targets is not a requirement.

Business plan reviews are conducted quarterly at all levels of the case utility. Business plan reviews provide the forum for the assessment and application of EPM information. As part of the reviews, the state of environmental objectives, actions, programs, measures and targets are reviewed. The business plan review processes may lead to the development of corrective or preventive actions to address non-conformances with environmental objectives, targets and performance requirements related to environmental actions and programs.

At a corporate level, the CSP review is conducted by the Executive Management Committee. A Corporate EMRC and a Corporate Health and Safety Committee may provide input or recommendations for this review. The Corporate EPC supplies data and information for the corporate environmental goal section.

At a business unit level, the business plan reviews are conducted by the Business Unit VP and Division Managers under the scope of the business unit. EMS Review Committees at a business unit level may provide recommendation or input for this business plan review. Environmental performance related data and information is supplied by Business Unit EPCs.

At a divisional level, business plan reviews are conducted by the Division Manager and Department Managers under the scope of the division. EPM data and information at this level may stem from measurement representatives or from Department Managers.

Finally, at the departmental level, business plan reviews are conducted by the Department Manager and staff designees under the scope of the department. EPM data and information is supplied by measurement designees who are typically at an individual staff level.

2.2 EMS Management Review Processes

EMS management reviews are conducted quarterly at the corporate level within the case utility. There is a Corporate EMRC responsible for conducting this EMS review. The Corporate EMRC is chaired by the General Counsel and Corporate Secretary to the President and CEO and comprises the Occupational Health and Safety (OH&S) Department Manager, the Public Affairs Department Manager, and two Division Managers from each of the Energy Supply, T&D, and CS&M Business Units. The Corporate EMS Coordinator is the secretary for the Corporate EMRC. At the business unit level, there is one EMS Review Committee for the Energy Supply Business Unit and one EMS Review Committee for both T&D and CS&M business units. The Business Unit EMS Review Committee members are Division Managers within the business units. The Business Unit EMS Coordinators serve as secretaries to these committees.

For T&D and CS&M, not all divisions are represented on the EMS Review Committee. For the Energy Supply Business Unit, the EMS review process has been integrated with a VP Communication Meeting process. Each business unit conducts monthly VP Communication Meetings with all Division Managers and the Business Unit VP in attendance. Energy Supply has abandoned the notion of having a separate EMS Review Committee and process because the VP Communication Meetings involve the same personnel and can provide a forum wherein the EMS review requirements can be met. The VP Communication Meetings may also provide the time period for business unit BP processes. In other words, business unit business planning and review activities may be conducted in the time allocated for VP Communication Meetings. T&D and CS&M have a separate EMS review process with division management representation from both business units.

The EMS review process serves to ensure the continuing suitability, adequacy and effectiveness of the EMSs with consideration given to, but not limited to, emerging issues, changing conditions and information, EMS related processes, policies and principles, performance related to corporate, business unit and certain division level environmental objectives, targets, actions and programs, regulatory compliance performance, audit recommendations, and performance related to audit follow-up actions. The EMS review processes at corporate and business unit levels have been integrated in the sense that the corporate level EMS reviews do not duplicate the efforts of the business unit EMS reviews. The EMS review at the corporate level is a high level review. It does not necessarily go into detail on operational level processes and programs. The corporate EMS review process has been established more as an EM advisory function to the Executive Management Committee, rather than a detailed review function. It serves as a filter for EM information before it reaches the Executive Management Committee. Corporate and Business Unit EMS Coordinators work in close relation and share the information gained through EMS review processes. The business unit EMS review information feeds into the corporate level EMS review.

The EMS Review Committees have no authoritative power in terms of directing staff and line management. Members of these committees may have directive authority in terms of their regular position within the company; however, the committees recommend action to executive level management who can direct action. Therefore, the Business Unit EMS Review Committees report and provide advisement to the Business Unit VPs, while the Corporate EMRC reports to and advises the Executive Management Committee.

2.3 EM Program Specific Review Processes

Within the case utility, at departmental and divisional levels, there may also be review processes that are specific to certain EMS programs. These reviews serve to assess and apply program specific EPM data and information and resolve any issues surrounding the program. Corrective and preventive actions may result from such reviews and information gained will flow through the EPM process structure for environmental objectives, targets and programs.

It should be noted that the coordination and implementation of certain EMS programs may be the responsibility of separate business areas. For example, the case utility's Hydraulic Operations and Engineering Department under Energy Supply coordinates a debris management program; however, the

implementation of the program is the responsibility of the corporate level Aboriginal Relations Division. A performance review of such programs would be directed by the business area leading coordination responsibilities, but it would cross functional boundaries with input and involvement from both coordination and implementation personnel.

2.4 SMS Operational and Emergency Control Self-Assessment Scheme

Within the case utility, measurement related to regulatory compliance takes on different forms. There are corporate wide or core operational controls and emergency controls that are partially built around environmental regulation and corporate policies. The core operational control and emergency control documentation includes the Hazardous Materials Management Handout, Corporate Fire Manual, Code of Practice for Compliance with the Workplace Hazardous Materials Information System (WHMIS), Code of Practice for the Storage of PCB's, Code of Practice for Workers Working with or around Asbestos or Man-made Mineral Fibre, Guidelines for Mold Remediation projects, and Code of Practice for Petroleum Product Storage Tank Systems. The Code of Practice for Petroleum Product Storage Tank Systems is maintained by a Mechanical Engineering Department under the scope of the Energy Supply Business Unit Engineering Services Division. The remainder of the above listed operational and emergency control documentation is maintained through the case utility's OS&H Department. The implementation of core operational and emergency controls is a Department Manager responsibility.

The case utility's OS&H Department has developed an implementation guide and self-assessment scheme for the operational and emergency controls that it administers and maintains. This guide and self-assessment scheme is known as the Safety Management System (SMS) Manual. The SMS Manual encompasses twenty-two components. Seven of these components are linked to the company's EMSs. These SMS components guide the implementation of specific control requirements and drive the monitoring and measurement for the associated controls. The EMS elements related to operational control and emergency preparedness and response are partially driven by the SMS and administered by the OS&H Department. The seven environmentally related components of the SMS Manual are safety and health training and awareness, workplace safety and health inspections, WHMIS (Workplace Hazardous Materials Information System), asbestos containing material and man made mineral fibre, transportation of dangerous goods, hazardous waste, and releases in terms of response and prevention. It is important to note that individual SMS modules may be affected by multiple controls. Operational and emergency control requirements may cover various activities. For example, the hazardous materials management handout covers storage, handling, transportation and disposal of hazardous materials.

Each SMS component or module highlights a series of applicable requirements in question form, associated performance measures, and supporting notes. For example, under the hazardous waste module, one of the requirements is "have the appropriate hazardous waste generator numbers, licenses or registrations been obtained and maintained?" The measures for each SMS module vary; however, with the exception of safety and health training and awareness, all of environment related SMS modules have a measure for "percent of requirements achieved or in place". The SMS module for safety and health training and awareness has a measure for "required training conducted" and a measure based on an annual internal safety perception survey. Additionally, the SMS module for releases has a measure related to the number of reportable and non-reportable releases.

The SMS Manual self-assessment scheme uses a database system for compilation and communication of the measures. The measurement data is not necessarily communicated, but rather, made available through secured access to the database. The case utility recently implemented a separate database system for the tracking of safety related performance data, and it is working towards having both integrated. The SMS was established as a tool for managers and Workplace Safety and Health (WS&H) Committees to identify and track actions needed to ensure the safety and health of employees. It was also established as the driver for a consistent corporate wide self-assessment process for core safety and health-related requirements.

WS&H Committees have been established throughout the case utility to plan, schedule and organize SMS activities, to conduct safety meetings, to measure, track and communicate safety and health performance, to ensure that workplace safety inspections are conducted, and to resolve, recommend or take action on safety and health issues or concerns. The WS&H Committees partake in safety inspections at intervals not exceeding two months. They also participate in accident investigations, as necessary. In the case of an accident, the Department Manager is responsibility for directing the implementation of corrective or preventive action to rectify the cause of the accident or to reduce the risk of accident reoccurrence. WS&H Committees may recommend or participate in the development and implementation of safety and health related corrective and/or preventive action stemming from safety inspections, accident investigations and performance reviews.

WS&H Committees are structured with two management representatives assigned by line or department level management (note that Line or Department Manager could be the management representative) and one employee representative for every twenty-five field employees or for every one hundred and fifty office employees. The WS&H Committees are required to report on a quarterly basis, as applicable, the measures defined in the SMS Manual. There are also Field Safety Officers throughout the case utility who provide expertise to Line or Department Management on safety and health issues. They ensure that the WS&H Committees are functioning consistently and according to corporate and legal expectations. The Field Safety Officers coordinate accident investigations and review accident investigation reports at the direction of department management.

There is a Corporate Safety and Health Committee that performs a parallel role to the Corporate EMRC in the context of safety management. The Corporate Safety and Health Committee is chaired by a Business Unit Vice-President and comprises Division Managers, the OS&H Department Manager, and labour union representatives. Its key responsibilities include the following:

- Reviewing and recommending necessary changes to corporate level safety and health policies, safety goals, performance targets, objectives, and initiatives
- Reviewing safety related performance reports at business unit and divisional levels and providing recommendations
- Assessing the effectiveness of corporate safety initiatives and reporting to the Executive Management Committee
- Reviewing significant changes to safety and health legislation and ensuring that plans are in place to comply

The Corporate Safety and Health Committee meets quarterly and receives a quarterly performance report from the OS&H Department Manager based partially on the SMS data provided by the WS&H Committees, feedback from Corporate Safety and Health Officers, and feedback from WS&H Committees and other delegates.

The case utility's OS&H Department is not a corporate level department. It falls under the Finance and Administration Business Unit Human Resources Division. It has no directive authority over Division or Department Managers, which reflects the fact that the safety of employees is a management responsibility and not that of a single department. Despite its layout within the case utility's organizational structure, the OS&H Department does perform certain corporate level responsibilities. Within this department, there are Corporate Safety and Health Officers responsible for identifying, developing, leading and revising the implementation of corporate wide programs to enhance the overall OS&H system.

Among the Corporate Safety and Health Officers are the Occupational Health Officer, the Occupational Health Chemist, the Dangerous Goods Officer, the Hazardous Materials Officer, the Health Hazard Officer, the Workplace Environment Officer, and five Safety Officers. The OS&H Department also comprises a Corporate Fire Marshall. In the context of operational or emergency control control, these Officers develop related policies, programs and rules with input from internal and external experts, regulators, field safety officers, WS&H Committees, and management at various levels. They have responsibility related to maintaining the core operational and emergency control documentation listed above. This requires that they work in close relation, as certain codes of practice and guidelines require input from more than one Officer. Certain Officers have been established as Corporate Level Core Operational or Emergency Response Control Lead Personnel responsible for leading the maintenance and

communication of control requirements. These Core Operational or Emergency Control Leads report to the OS&H Department Manager. Significant changes to the environmentally related operational and emergency control frameworks may be reviewed by the Corporate EMRC, as necessary.

At the business unit level throughout the case utility, there are delegates of the Core Operational and Emergency Control Leads. These delegates include Field Safety Officers, Business Area Spill Coordinators, Emergency Response Coordinators, and Business Unit Operational Control Coordinators (e.g. the Waste Management Coordinator for all business units). These delegates have specific responsibilities related spill and incident reporting, investigation and follow-up. They may have responsibilities related to deploying controls and advising management on control requirements. Based on liaison with field level staff and departmental management, these delegates may also compile and provide feedback on the effectiveness and implementation of controls and programs maintained by the OS&H Department.

The SMS Manual and its associated measurement framework are maintained by a SMS Review Team. The SMS Review Team is charged with defining measures, reviewing new components to the SMS, providing guidelines for collecting and reporting SMS data, and reviewing and improving requirements for the SMS modules. The SMS Review Team does not necessarily meet at set intervals and is not concerned with safety performance. Rather, the SMS Review Team is concerned with improving the SMS Manual and measurement system based on its effectiveness in terms of ease of use, consistency of application and interpretation, and ability to convey safety and health related control requirements.

2.5 Measurement Processes for Emergency Prevention and Response Controls

Control requirements related to fire prevention and response are not covered in the SMS Manual in an attempt not to dilute their importance or application. At a department level, facilities, such as dams and converter stations, have emergency and spill response plans that are maintained by the Department Manager. Furthermore, these facilities all have teams established to implement spill and emergency response procedures. Emergency response plans cover the potential for fire and procedures related to fire prevention and response. The Corporate Fire Manual is maintained by the Corporate Fire Marshall.

At the implementation level, compliance with fire prevention and response controls and regulation is inspected periodically by technically qualified personnel within the OS&H Department or by delegates of the department such as Field Safety Officers. This is done in coordination with Department Management and in accordance with the Provincial Building Codes and Provincial Fire Code regulations. An inspection report is prepared highlighting findings and recommending corrective action. It is then submitted to the Corporate Fire Marshall for review and approval. Additionally, the Corporate Fire Marshall runs periodic fire tests or drills to ensure that emergency response and evacuation plans are followed and to provide assurance that such plans are capable and timely. The inspections and testing drive the measurement for fire related operational and emergency controls.

The SMS Manual has provisions for safety inspections that are carried out partially to examine whether proper emergency and spill response provisions are in place. In addition, the implementation of emergency and spill response plans may be tested periodically at the direction of Department Managers and Spill or Emergency Response Coordinators. Also, investigations may be performed following spills or accidents in order to assess the need for further corrective or preventive action beyond immediate response actions such as containment and remediation.

The SMS does cover certain facets of emergency preparedness and response through its requirements. For example, under the SMS spills and releases module, there is a requirement that reads "Have all releases been reported within 24 hours to the Corporate Hazardous Materials Officer, the Area Spill Response Coordinator, applicable line management, and the applicable regulatory agency." On the other hand, not all provisions will stem from the SMS Manual, as is the case with fire prevention and response.

2.6 Measurement Processes for Non-Core EM Controls

Within the case utility, there are operational controls that are maintained and administered separately from the OS&H Department. The Energy Supply and the T&D and CS&M Business Unit EMS Manuals cover both core and business unit specific operational controls. For example, under the Energy Supply EMS, there are controls related to the design, construction, operation, maintenance, and decommissioning of Energy Supply related facilities and projects.

For the design of an Energy Supply project, there are processes that are undertaken or controls in place to justify projects, to obtain development agreements, to conduct environmental evaluations, to incorporate general environmental considerations into the review and development of technical design concepts, and to establish baseline environmental conditions and mitigation or compensation requirements. Depending on their type, size and environmental aspects, Energy Supply projects will typically require regulatory approvals. For example, a licensable energy generation project such as a hydro-electric generating station requires an Environment Act License that is obtained through an application to the Provincial Conservation Body. The application to be submitted involves an environmental impact assessment process. There are Provincial and Federal Environmental Assessment Acts that govern the environmental assessment process. For a hydro-electric generating station project, environmental assessment involves specific environmental studies and consultation programs with interested and affected parties.

Licensing and authorization decisions for a generation facility are typically based on government review of an extensive environmental impact statement and environmental protection plans. This process provides regulators with assurance that environmental aspects have been identified and will be managed, environmental impacts have been identified and will be minimized or compensated, and environmental consequences have been factored into the project planning phase. The environmental assessment processes lead to the issuance or non-issuance of provincial, federal or municipal environmental licenses, permits, approvals and/or authorizations.

If an Energy Supply project is approved through environmental assessment and regulatory approval processes, then the conditions stipulated in the environmental impact statement and in environmental protection plans are factored into facets of engineering design, construction, operation, maintenance and decommissioning. For example, certain conditions may factor into technical specifications and tender documents. There are operational and emergency controls related to construction in the form of on-site standard operational procedures, site specific spill response plans, environmental and natural resource permits, and applicable core operational and emergency controls.

For certain environmental licenses, there are reporting requirements to demonstrate adherence to defined license requirements. EPM activities are necessary to collect the data and information to demonstrate this adherence and to monitor environmental conditions to confirm expectations from environmental impact assessment and to identify and mitigate any unforeseen environmental impacts. These EPM activities are typically undertaken at the employee level and are coordinated by the departments responsible for maintaining and administering the license. There are instances where one department is responsible for procuring an interim license for construction, while another department becomes responsible for procuring a final operating license and maintaining the license thereafter. For instance, within the case utility, the Environmental Licensing and Protection Department applies for and procures interim licenses under the Provincial Water Power Act, while the Hydraulic Engineering and Operations maintains the interim license, procures final license and license renewals, and directs related EPM activity.

Within the case utility, environmental controls related to license procurement and engineering design are well established. In Energy Supply, the functional divisions related to engineering services, power planning and development, and power sales and operations work in close relation. Likewise, in T&D, there is close relation between the functional divisions related to transmission planning and design, distribution planning and design, transmission system operations, transmission construction and line maintenance, and distribution construction. In terms of project planning and design, there is strong cross-

functional coordination between the associated T&D and Energy Supply divisions. It is the operation and construction of assets in accordance with regulated requirements that poses the greatest environmental risks on the case utility.

As discussed, the conditions of licenses, permits, approvals, authorizations, and environmental protection plans will form the basis of certain operational controls. For example, hydro-electric generating facilities all have operating guidelines that are built partially around the limits stipulated in the Water Power Act license. Another example is the case utility's Dam Safety Program and Guidelines that are established at each hydro-electric generating facility and include guidelines for emergency preparedness and response plans. There are also maintenance related controls that define maintenance procedures for generating facilities, transmission lines and other equipment. These controls are maintained by specific business areas at the direction of the Department or Division Managers.

The business area responsible for leading the development of an operational control is typically the one responsible for maintaining the control based on changing circumstances, compliance performance and control effectiveness. For example, the case utility's Hydraulic Engineering and Operations Department develops the operating guidelines for hydro-electric generating stations that specify discharge limits and water level limits. This department manages a hydro-metric monitoring network throughout the Province to monitor water levels, meteorological conditions and some velocity and flow conditions. This department maintains the controls related to the Provincial Water Power Act and Water Rights Act, and the Federal Navigable Waters Protection Act. As part of the Water Power Act, there is an annual submission requirement to the Provincial Conservation Body based on the hydro-metric network and generating station data. The department screens hydro-metric data collected for accuracy and to check compliance with operating limits. Furthermore, the department will periodically check compliance with operating limits at generating stations. It is responsible for communicating control requirements and any changes thereto to the Department Managers responsible for directing the implementation of the controls. It is responsible for directing action on compliance performance related to the environmental licenses and permits that it maintains. This includes planning and directing corrective actions to address any citations, orders or warnings received from the regulators.

There may be situations where the Department Managers responsible for directing the implementation of a specific operational or regulatory compliance control is dually responsible for acting on compliance performance. This depends on the situation and the Department Manager's authority. For example, if control measurement indicates that a certain process is significantly exceeding regulated water usage limits, then the Department Manager accountable for the performance of this process should implement corrective action immediately to avert potential regulatory action or emergency situations. The Manager responsible for maintaining water usage permits and controls should be informed of non-compliance and should assess the need for further remedial action beyond immediate response.

Specific business areas maintain non-core controls, and there are localized forums to review and assess control and/or compliance performance. EPM activities to measure regulatory compliance related to licenses are well established and the reporting of such EPM data follows well defined communication linkages within the case utility. The maintenance of controls built around license stipulations and environmental regulation requires that the personnel responsible maintain awareness of issues affecting the controls, the performance related to regulatory compliance being controlled, and the effectiveness of the controls in terms of use, suitability, and capability. Feedback on the effectiveness and use of non-core operational controls does not necessarily flow in a systematic manner through the case utility. Rather, it is reactive or relies on informal communication between those responsible for maintaining the controls and those responsible for directing their implementation.

Non-core operational control documentation is typically distributed to the managers responsible for directing the implementation of the controls. Furthermore, control requirements and changes thereto are communicated to the managers responsible for directing their implementation. Despite the communication links between Non-core Operational Control Lead Personnel and Department Managers responsible for directing control implementation, the case utility has developed a tool for managers to identify and have access to legal requirements to which the organization subscribes. This tool is the "Guide to Environmental

Legislation" and it describes the various environmental statutes that apply to the broad scope of the case utility's operations. It is maintained at the direction of the Corporate EMS Coordinator. It is the responsibility of Department and Division Managers to maintain awareness on the environmental regulations and the associated controls that apply to their business area; however, there is no link between the "Guide to Environmental Legislation" and the controls in place governing compliance with environmental legislation.

There may be situations where certain environmental legislations are not covered by operational or emergency control requirements. In these cases, the legislation and associated regulations are the controls. The Department or Division Managers who manage operations governed by such legislation assume responsibility for communicating compliance requirements to staff, assessing compliance performance based on EPM data or feedback from the implementation level, planning and directing action on compliance performance, and maintaining awareness of the issues surrounding the legislation through liaison with internal and/or external experts.

3.0 Expanded Discussion on Case Utility System-Based EPM Processes

As discussed, the case utility achieved ISO 14001 registration in 2002. In establishing the ISO 14001 compliant EMS, the IAD conducted an EMS gap analysis, which was finalized in March 2002. Following the gap analysis, internal EMS audits were conducted for each of the three EMS registrations. The final internal audit reports were dated December 2002. These internal EMS audits did not coincide with the EMS registration audit that was completed November 1, 2002. Since the December 2002 series of internal EMS audits reports, there were no other internal EMS audit reports produced at the time of this research. Analysis of internal EMS auditing within the case utility is focused on the preliminary round of EMS audits that were conducted, the long-range overall audit program plan, and the annual internal EMS audit plan.

3.1 Comprehensive Auditing

Comprehensive audits are scoped within individual departments. Their purpose is to assess the effectiveness, efficiency and economy of departmental resource use. Resources include people, equipment, tools and money. Comprehensive audits provide a systematic review of management control systems for selected operations and functions. As part of the scope determination process for comprehensive audits, IAD considers the asset management, computer resource management, customer service operations, facility or equipment design, construction, maintenance and operation, financial disbursements and receipts, human resource management, planning and budget management, materials management, safety performance management, land and water use management, and EM. Therefore, as part of the comprehensive audit program, there is an EM audit component.

At the time of this research, comprehensive auditing was not integrated with internal EMS auditing. The Lead Internal Auditor was in the process of identifying EMS audit coverage elements that could be accomplished through the comprehensive audits. Because the comprehensive audits are scoped within a single department, only parts of a full internal EMS audit plan can be accomplished through comprehensive auditing. Comprehensive audits do not assess the EMS linkages between corporate management down to individual staff. They can check compliance with established management practices, corporate directives, and regulatory requirements; however, findings will be constrained to a departmental scope. Although they are not meant to be compliance audits, comprehensive audits may fulfill certain environmental compliance auditing objectives.

Comprehensive audits are conducted in a similar fashion to EMS auditing described in Appendix B. There are planning, execution, reporting, and follow-up phases. Audit scope, coverage, criteria, execution methodology, findings, recommendations and conclusions will differentiate auditing functions. For comprehensive audits, a draft report is submitted to the audited Department Manager. Follow-up action plans are prepared by the Department Manager and reviewed by the department's Division Manager, who provides approval. The IAD incorporates approved follow-up action plans into a final comprehensive audit report that is submitted to the audited Department Manager, the audited department's Division Manager, the appropriate Business Unit Vice-President, and the President and CEO. An Executive Summary Report is also prepared by the IAD and submitted to the audited Department Manager, the audited department's Division Manager, and the IARC. The audit clients for a comprehensive audit include the President and CEO and the IARC.

The case utility's Board of Directors could also be seen as a client for all types of audits conducted by the IAD. The IAD produces an annual report summarizing all audits and issues uncovered. This annual summary report is submitted to the President and CEO, the IARC and the case utility's Board of Directors. It is important to note that IAD plans the audits and none of the clients listed above have absolute directive authority over IAD. The clients may provide recommendations to be considered by the IAD.

The Lead Internal EMS Auditor partakes in comprehensive audits. In terms of resource allocation, the Lead Internal EMS Auditor has dedicated a total of one hundred and sixty-five days for the comprehensive audits. For the EM component of comprehensive auditing, the Lead Internal EMS Auditor

plans to prepare a summary report for the Corporate EMRC highlighting EMS related findings, conclusions and recommendations. Consequently, the Corporate EMRC is now a client for comprehensive audits, but it does not provide parameters or input to the comprehensive audits.

As part of the annual internal audit plan covering all internal audits to be conducted over the course of the 2003-2004 year, there is an objective under environmental audit coordination to maintain liaison with environment and health and safety representatives within and outside of the case utility. This objective applies to both the environmental component of comprehensive audits and internal EMS auditing. In the planning phase of comprehensive audits, consultation with the proposed scope, coverage and criteria determination sources occurs in an informal manner and at the discretion of the Lead Internal EMS Auditor. The Department Manager of the business area to be covered in a comprehensive audit will always consulted in the planning phase for comprehensive audits.

3.2 Internal EMS Auditing

The case utility's annual internal EMS audit plan for 2003-2004 can be broken down into three parts. First, there is to be a review of the case utility's EMSs to ensure continuous improvement in documentation and procedures for conformance to the EMS standards. This review is classified as a review of the implementation and operation of the EMSs. It is intended to verify understanding of the impact of EMS requirements on the execution of daily work activities at various organizational levels. This review is focused on the implementation and operation of the EMS, checking and corrective action and EMS management reviews.

The second part of the EMS audit plan involves the review of findings and follow-up action stemming from previous audits. The previous audits to be considered include the internal EMS audits from 2002 and surveillance audits that were conducted by the company's Registrar following ISO 14001 registration.

The third part of the EMS audit plan involves a review of specific EM programs. For the 2003-2004 annual EMS audit plan, two programs are to be reviewed. They include the case utility's spill and release prevention program and its PCB management program. The PCB management program was spurred by changing regulation and involves the action plan for compliance to Federal PCB regulations.

In terms of resource allocation, the Lead Internal EMS Auditor has set aside sixty days to accomplish the planned internal EMS audit activities. Fifty days have been set aside for coordination or planning activities related to internal EMS audits and the environmental component of comprehensive audits.

4.0 Discussion on Case Applicability to Proposed Result-Based EPM Network Structure and Process Models

Within the case utility, the process for the setting and reviewing of environmental objectives, measures, targets, actions and programs is consistent with the proposed process in Figure B3. The variables in this process diagram are the EPM and review processes for different business areas and different organizational levels. In Figure B3, the process for EPM involves measurement data collection, analysis of measurement data against performance criteria, and communication of measurement information so that it can be assessed and applied through performance review processes. This process is broadly applicable to EPM throughout the entire case utility; however, there will always be variables in terms of the rationale for EPM and in terms of the specifics on how measurement data and information is collected, analyzed, communicated and applied.

From Figure B3, an integrated EMS and business plan review has been proposed for the business unit level. Data, analysis and information pertaining to the environmental goal sections of business unit business plans are reviewed through EMS review processes in addition to business plan review processes. It stands to reason that there should be some integration between these processes. The EMS review could be accomplished through the business plan review with certain additions to the review agenda. This is occurring in the Energy Supply Business Unit with the integration of the EMS review process and VP Communication Meetings. For CS&M and T&D business units, there are separate EMS and business plan review processes.

The case utility's network structure for the EPM processes related to environmental objectives, targets, and programs is consistent with the proposed structure in Figure B2, but there are certain issues to note. First, the positions of Business Unit EMS Coordinator and EPC have not been integrated at a business unit level, and they do not necessarily work in close relation. Secondly, the Business Unit EPCs are members of measurement teams for the business unit business plans. The teams are responsible for supplying measurement data, data analysis, and information to the business unit BP processes. In the T&D Business Unit, PM team members are selected by the team leader based on expertise. In the Energy Supply Business Unit, this is not necessarily the case, as certain members have been selected based on expertise and others have assumed their roles to balance work load. Ideally, membership for a PM team should be based on expertise.

Referring to Figure B5 (Result- based measurement process for environmental regulatory compliance, operational control, emergency response and other requirements in an energy utility), this process diagram partially reflects what occurs within the case utility. The SMS is the framework for self-assessing the implementation of core operational and emergency controls. Assessment of fire related operational and emergency control protocols is an exception to the SMS scheme. There are no systematic self-assessment processes capturing non-core operational controls. There are localized forums for the assessment of regulatory compliance performance, for the preparation of regulatory submissions, and for assessing and planning action based on the effectiveness and use of non-core operational controls.

Referring to Figure B4 (Structure for result-based EPM process for environment and safety related regulatory compliance, operational and emergency control in an energy utility), the proposed structure is relatively consistent with that of the case utility. One issue to note is that not all core operational or emergency controls will have an associated Business Unit Control Lead. For example, there were no lead personnel in the case utility's business units for mold remediation or for asbestos related control. There may be resident experts and designees of corporate level Core Control Leads throughout the business units that can offer advisement related to particular fields and controls; however, they are not necessarily established as Operational Control or Emergency Control Leads. Additionally, within a business unit, designees or Business Unit Core EM Control Leads can function at different organizational levels. Non-Core EM Control Leads can also function at different organizational levels. This structure model presents a generalization of what the case utility does in that Control Leads and delegates have been designated, but they are not dubbed Control Leads and this relationship is not transparent.

Another issue to note with Figure B4 is that communication between Operational and Emergency Control Leads and EMS Coordinators does not occur in a formalized or systematic manner. EMS Coordinators are kept informed on significant changes or issues surrounding operational and emergency control at the corporate level or within particular business units. It is not the responsibility of the EMS Coordinators to know every minor detail about operational and emergency controls. At the corporate level, the Corporate EMS Coordinator and the OS&H Department Manager maintain regular communication. Direct communication between the Core Operational and Emergency Response Leads and the Corporate EMS Coordinator occurs as necessary. At the business unit level, the Business Unit EMS Coordinators maintain informal lines of communication with business unit specific or Non-Core Control Leads. Business Unit EMS Coordinators do not necessarily maintain communication with the OS&H Department Manager or with Core Operational and Emergency Control Leads. Rather, they are kept informed through the Corporate EMS Coordinator.

Another issue to note with Figure B4 is that there is no communication link between Division Managers and Workplace Safety and Health Committees. The committees have ties to Department Managers, but reporting on SMS measures is done through a database system. Once the committees have entered the data and information, it is accessed at a corporate level through the OS&H Department. Division Managers do not use the SMS data and do not have any direction over Workplace Safety and Health Committees. Furthermore, Workplace Safety and Health Committees are cross-functional in that they may represent several departments and more than one division.

5.0 Description of Inefficiencies Related to SMS Measurement System

There are certain issues to note with the SMS Manual and its measurement processes. There is no structured corporate-wide procedure for following-up on spills and releases. Currently, spills and releases are investigated, reported on and acted on individually at the direction of Area Spill Response Coordinators and Department Management. There is no analysis of spill reports at a corporate level to identify root causes, risk areas and risk activities. Furthermore, the reporting of spills is inefficient in that spill incident reports are prepared at a staff level. These reports are submitted to regulators, as required. The spill incident reports are used by the WS&H Committees in recording measurement data related for the releases module of the SMS. This spill measurement data is used by the OS&H Department Manager to prepare a monthly corporate spill report for the Executive Management Committee and staff. It is also used to prepare a quarterly safety performance report for the CSP and the business unit business plan review processes. The spill data reaches the corporate level before it is broken down to be assessed and applied at the business unit level. Finally, there is no verification to provide assurance that all spills are being reported and that spill incident reports are being completed accurately.

The "percent requirements achieved" type measures are leading performance indicators. On the other hand, these measures are index based and originate from averaging scores on a series of independent requirements. This indexing can hide certain issues, priorities and risks because specific data may not be readily available, certain requirements can skew the index, and measurement to assess the accomplishment of certain requirements is subjective. Secondly, the OS&H Department does not have directive authority over Department Managers or individual staff. Consequently, there are no apparent consequences if WS&H Committees are not reporting the SMS measures completely or accurately. The SMS measurement reporting process should not be seen as an optional requirement; however, at the time of this research, only a portion of WS&H Committees were reporting SMS measures on time (approximately 65%).

Some data entry for the SMS is not always timely due to reliance on other measurement systems. For example, under the safety and health training and awareness SMS module, data on the "required training conducted" measure comes from a Human Resources Management System measurement database. Due to time lag between data compilation for different measurement systems, there are instances where parts of the SMS measurement process are delayed.

Reporting of certain SMS measures may not be timely with quarterly reporting as the minimum reporting requirement. There is no monthly dashboard for the SMS. The SMS self-assessment scheme is meant to provide an indication of whether or not business areas are complying with imposed control practices and requirements. It is also meant to provide early indications of the potential for non-compliance. Concern may arise if non-compliance with certain SMS requirements goes undetected for an entire quarter.

The WS&H Committee members are elected. This can lead to instances where the personnel responsible for collecting and entering SMS measurement data do not have the knowledge or competency related to certain SMS modules to record measurement data accurately. Also, certain WS&H Committee members may lack the knowledge and competency related to certain SMS modules needed to develop appropriate action plans.

The SMS measurement process is not integrated with the BP processes. The SMS self-assessment indexes and the scores on individual requirements do not factor into BP. Lagging indicators of safety performance do factor into BP. For instance, under the corporate safety goal, the three main safety performance indicators are the number of high-risk accidents, accident severity rate (calculated days lost per 200,000 hours worked), and accident frequency rate (calculated accidents per 200,000 hours worked). Under the environmental goal section of Energy Supply and T&D business plans, there are measures related to the number of spills to the environment. The measures for spills lack context in that they do not provide any analysis into spill severity or frequency. They are limited in that they do not serve to quantify spill risks.

6.0 Discussion on Case Utility EPR Practices

6.1 Reporting for Requirements Satisfaction

As part of the case utility's membership to the CEA and to the ECR Program, an ECR Program submission is prepared on an annual basis. This submission is prepared by the Corporate Environmental Performance and EMS Coordinator and by the T&D EPC. For this report, the case utility has integrated personnel with report preparation responsibility and personnel with EPM data and information compilation, analysis and communication responsibilities. This integration of responsibilities also applies to the Voluntary Challenge and Registry (VCR) Program and its associated reporting requirements. The purpose of the VCR Program is to encourage business and government to voluntarily limit and reduce GHG emissions stemming from their operations. As part of this program, an annual report is submitted that includes GHG emission base year quantification, actual versus forecasted emissions, target setting, measures or actions to achieve the targets, results achieved, and education training and awareness initiatives. The VCR Program provides incentive to participate through reporting and leadership recognition awards and titles. A VCR Program Report is prepared on an annual basis at the direction of the Manager of the Energy Policy and Emission Trading Department under the scope of the Energy Supply Business Unit's Power Planning and Development Division. This department is dually responsible for supplying GHG emission measurement data and information to the corporate BP process.

As part of the case utility's frameworks for environmental compliance control, there are localized processes to report environmental compliance performance to regulators. For example, the case utility's Hydraulic Engineering and Operations Department submits data to the Provincial Conservation Board on water usage to demonstrate compliance with the Provincial Water Rights Act and related water usage permits. This department is responsible for maintaining permits under this act and directing corrective or preventive action to ensure continued compliance. Another example is regulatory submissions administered through the OS&H Department. This department is responsible for maintaining the relationship between the case utility and safety and health regulators. As part of this responsibility, the department submits accident and incident records to the Workers Compensation Board, as applicable.

The case utility does not have any explicit benchmarking initiatives for environmental performance data. The ECR Program Annual Report could be used to benchmark, but there are issues with data comparability. The CEA provides members with a Key Performance Indicator Program. The program has become known as the COPE Program and it is intended to provide members with the ability to benchmark high-level comparative key performance indicators (KPIs). COPE members have annual data submission requirements. The CEA manages a database for the program and produces a series of annual reports to present composite data. These annual reports are organized according to services or business units. Each presents a balanced scorecard comprising KPIs covering customers, employees, shareholders, environment, and regulators. Currently, the environment section does not have any KPIs and refers the reader to the ECR Program. It is recommended that the measures for the ECR Program be refined to provide comparable environmental indicators that could explicitly be used for benchmarking purposes

6.2 Voluntary Reporting

The case utility publishes their Corporate Strategic Plan (CSP) on an annual basis. This reporting is integrated with BP, since the CSP is an output of the process. The Executive Management Committee develops the CSP, and there is considerable judgment on what to include in the CSP. There may be certain programs or objectives that are confidential and should not be publicized in the CSP. At the corporate and business unit levels, a listing of proposed environmental objectives and programs is prepared. Certain environmental objectives and programs may appear on these listings and may be included in lower level business plans, despite exclusion from the CSP. The CSP is used as both a publicity and internal policy tool.

The case utility also publishes an Annual Report and a Sustainable Development Report. The Annual Report has prescribed format and content for financial statements. It also serves as a publicity tool by providing accounts on the company's achievements and operations over the course of the fiscal year. The recap section of the Annual Report can be customized. It is up to management to decide on what to include in this recap in order to shed a positive light on the company's operations and activities. There are inputs to the Annual Report throughout the case utility. The financial statement section is prepared by the Corporate Accounting Department under the Finance and Administration Business Unit. The preparation of the environmental recap section is directed by the corporate level Public Affairs Department. The year in review section of the Annual Report is organized into customer service, transmission and distribution, energy supply, environment, employees and safety, and community sub-sections.

The environmental section of the Annual Report did not present any indicator data; however, it did present accounts of several EM initiatives and achievements. The environmental section of the current Annual Report highlights the following:

- Climate change initiatives and awards received.
- The EM policy.
- The achievement of ISO 14001 registration.
- Environmental partnerships.
- The development and implementation of a new oil containment system at one of the company's converter stations.
- The installation of a hydrogen production system at one of the company's converter stations.
- Agreements and discussions in effect for new development and for past environmental impacts.
- The introduction of an awards program to recognize environmental achievements by Aboriginal peoples in protecting the environment or promoting environmental awareness.
- An alternative power exploration partnership for wind power development.

It should be noted that other sub-sections under the year in review portion of the Annual Report do present indicator data. For example, under the safety and employees section, there is discussion on the reduction of the number of high-risk accidents.

The case utility's Sustainable Development Report was last published for the year 2000. It is organized into four sections covering the community, the environment, economic management, and energy management. Under the environment section, there is measurement data presented for GHG emissions, reportable and priority spills, the utilization of solid combustion by-product (ash), and PCB management. Under the energy management section, there is measurement data presented for demand side savings targeted and achieved, internal energy efficiency for generation, conversion efficiency for fossil fuel generation, internal energy efficiency for transmission, and internal energy efficiency for distribution.

The Sustainable Development Report is prepared by an employee of the Environmental and Land-Use Planning Department under the scope of the case utility's Energy Supply Business Unit Power Planning and Development Division. This is done as a side project in order to balance workload.

It should be noted that comparability research was made into both Sustainable Development and Triple Bottom Line Reports in the energy industry. Both are very similar, with the exception that a Triple Bottom Line Report may have more focus on the financial pillar of the triple bottom line. The case utility's Sustainable Development Report already touches on all three pillars of the triple bottom including environment, social accountability and finance. As a result, the case utility determined that it is not necessary to switch reporting formats to a Triple Bottom Line Report because both are fundamentally the same.